

## MANAGEMENT VIEW

EDISON AWARD NOMINATIONS for electric utility performance in 1960 include only four companies. American Elect. Power Co.--for advancing steam-electric progress with its 475-megawatt Breed and Philip Sporn plants, for pioneer development of "bare hands" high-voltage live-line maintenance techniques, for electric space heating promotion (adding 6000 all-electric homes to AEP system lines); Georgia Power Co.--for initiating new concepts in service entrance policies . . . breaking the bottleneck of wiring costs to customers . . . and for a vigorous followup resulting in thousands of new appliance installations; Pennsylvania Elect. Co.--for pioneering the design and construction of America's first 460-kv transmission line operating as part of an integrated power system network; and So. California Edison Co.--for leadership in developing and promulgating advanced management policies . . . and for an outstanding load development program resulting in the achievement of national leadership in the installation of Medallion Homes.

WHAT PERCENT TAXABLE?--Utilities notified their stockholders as soon as possible after closing the books on 1960 operations, so individual income tax returns could reflect the portion of dividends upon which they actually owed Uncle Sam. Example: In the case of Detroit Edison shareholders this was figured to be 75.35 percent or \$1.507 of the \$2.00 paid in dividends.

EXPLAINING DROP IN EARNINGS was another job for some utilities. Example: Philadelphia Elect. Co. earnings applicable to common stock were off some \$55,000 ('60 vs. '59), or six cents less per share in dividends. Reasons: adverse affects of the general business slowdown, a cool summer season with reduced air conditioning loads, substantial additions to plant in service during the year with increased carrying charges on investment and a lower credit for inter-

est charged to construction, but with less than full year benefits from operating economies."

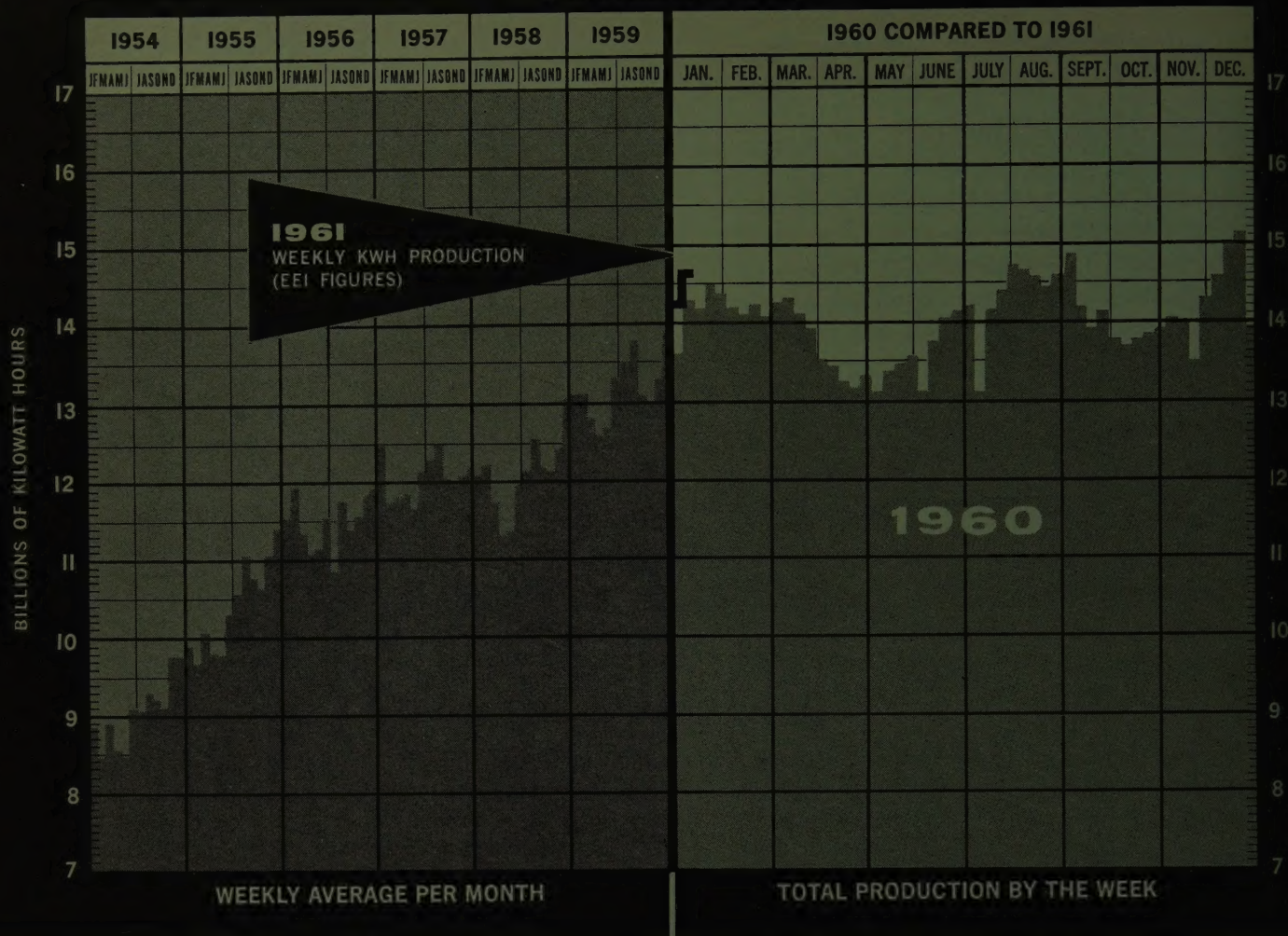
COLORADO RIVER POWER LINES which would be built by the Federal Government, according to a late-act of the retiring Interior Secretary Seaton, are vehemently opposed by top executives of the investor-owned utility companies involved. Comments P.S.Co. of New Mexico Pres. D. W. Reeves: "The decision, . . . would change the ground rules and break faith with the accepted program . . . dedicated to the reclamation of semi-arid lands . . . and if allowed to stand, the preference users pressure group will have obtained special privileges to which they are not entitled; and Utah P.&L. Co. Pres. E. M. Naughton says: "Utah P.&L. will oppose, before both House and Senate appropriations committees, the allocating of any funds to construct transmission lines which will parallel and duplicate our own lines . . . and will not alter its plans to interconnect with those of the Arizona P.S. Co."; and PG&E's V-P George H. Groh: "Secretary Seaton's announcement does not in any way alter our firm belief that a coordinated transmission system, built with a combination of Federal and private funds, will prove of greater benefit to the people of the states involved."

## ECONOMIC CLIMATE

SIGNS OF AN UPTURN are becoming evident, despite statements from high places that the U. S. economy is on the skids. Inventories, a key to the outlook, continue to decline--but they are shading off instead of dropping precipitously. There is evidence, too, that the bottom is being scraped in some lines. Inventories have become unmanageably small, and new orders placed with suppliers to these industries are starting to rise. The National Association of Purchasing Agents, whose day-to-day experience tends to anticipate official statistics, sees an eas-

# Electric Utility Barometer

(Source: Edison Electric Institute)



## NEWS IN PERSPECTIVE

ing to the business drop. It does not, however, expect "any significant upturn before late second quarter."

CONSUMER SPENDING, basic to the movements of the economy, has not moved up as rapidly as had been expected. During 1960, for example, spending by consumers of \$328-billion was only five percent higher than the 1959 figure. Durable goods--important to the pace of industrial output--took only 13-percent of spendable income, nondurables got about 47-percent, and 40-percent went for services. This year, many economists are leery of repeating their 1960 mistake of over-optimism. They know that incomes seem to be staying high and that during the postwar period people have spent between 92- and 93-percent of income after direct tax payments. If it is assumed that incomes

will rise \$12-billion this year--the high end of a range of conservative forecasts--consumer spending may reach \$340-billion.

ANTI-TRUST LAW VIOLATORS, fined and sentenced in Federal District Court in Philadelphia last month, had long before realized the far-flung ramifications of the government action which culminated in the penalties to companies (29) and individuals (44) found guilty of illegal marketing practices. Most significant action yet to come: damages recovery moves under Robinson-Patman Act provisions.

## WASHINGTON INFLUENCE

ANTITRUST CONSENT DECREES will be probed by the Senate Antitrust Subcommittee

e to see if they have constricted "the bit of effective antitrust enforcement," according to Sen. Estes Kefauver (Tenn.). Identical bidding in the electrical machinery industry will also be a subject for further investigation. The antitrust group's chairman, who has obtained \$450,000 for the subcommittee this year, thinks his most important hearing of 1960 involved administered prices in this industry. He believes the hearing to have been in large part responsible for the Grand Jury indictments of 17 manufacturers on charges of price-rigging. These cases terminated, in some cases, with decrees that will be looked at by the subcommittee. Kefauver figures that price reductions on transformers and switchgear alone have already saved \$200-million.

WIRE AND CABLE FIRMS have been hit by federal antitrust suits. The Justice Department wants American Smelting and Refining Co. to sell its holdings of Invermere Copper and Brass and General Cable Corp. Concurrently, it wants General Cable to divest itself of the stock and assets of nine wire and cable firms which it acquired between 1955 and 1959.

NATURAL RESOURCE PLANS of President Kennedy seem to portend additional Federal invasion of the utility field. In his Economic Message, the President said: "Also essential to economic growth are long-range energy resource development and accelerated programs for economical production of energy from nuclear sources, including nuclear fusion. We must begin now to also plan for regional cooperative pooling of electrical power. Both efficiency and growth goals will be served if we interconnect our hydroelectric and thermal power resource plants." Kennedy has also directed a speed-up of work on going public works, and he is getting a list of new starts in which work could be started quickly.

FULL DEVELOPMENT of river basins on the tune of \$12-billion for new dams and reservoirs over the next 20 years is recommended by the Senate Select Committee on Water Resources, headed by Sen. Robert Kerr (D., Okla.). The "ultimate answer" to the critical water problem,

says the report, lies in federal-state cooperation for full development of every major river basin. The Committee stresses its seeks cooperation, not federal domination. It would like to see plans completed by 1970 with the federal government granting on a matching basis to the states some \$50-million for water resource planning. Sen. Thomas Kuchel (R., Calif.) hailed the report as a milestone in resource development and said that no politics have been involved either within the committee or in its report. Some members of the group put the cost of meeting the water crisis as high as \$200-billion in public and private investment over the next 20 years. (This report was previewed in EL&P, in the Nov. 15, 1960 issue, page 69.)

PREFERENCE CUSTOMERS' power needs do not have to be totally met by the federal government, Kenneth Holum, Assistant Interior Secretary, has admitted. He says it is up to Congress to decide whether the government should build steam plants to meet preference customers' needs. On the ticklish question of who should build transmission lines, Holum said the decision should be made on the basis of economic capability. The Kennedy appointee opposes creation of a Missouri Valley Authority.

BURNS CREEK PROJECT has had its Congressional chances immeasurably improved by the high priority to be given to it by the Interior Department. Secretary Udall has also warned that he may change orders issued by the Department before the change of Administrations, but he does not foresee any "dramatic" alterations. Udall has asked FPC to return Bonneville's estimate of its future power needs--testimony already submitted on the conflicting applications for Nez Perce-High Mountain Sheep. This will presumably be reviewed by the new Bonneville Power Administrator, Charles F. Luce.

ECONOMIC A-POWER in less than a decade is forecast by AEC's General Manager, A. R. Luedecke. He says "we are confident that by about 1968 nuclear power will be competitive with that from fossil fuels in large stations of 300,000-kw or

## NEWS IN PERSPECTIVE

more in high cost fuel areas such as New England and the Pacific Coast."

WEATHER BUREAU BUDGET sought for fiscal 1962 is over \$55.6 million. This includes a drop to \$3.18-million for studies of tornadoes, hurricanes, and other severe storms. But the amount for meteorological satellite research would almost double, to \$2.2-million. (For maintaining its own weather service, PG&E recently received the top citation of the American Meteorological Society, which noted the utility's perception, imagination and leadership as the "first and probably the only U. S. utility company making full use of weather facilities and information in its daily operations.")

ELECTRIC-POWERED VEHICLES, called "Mailsters," with 62-percent more carrying space and about half the maintenance requirements of gasoline-powered vehicles, have been ordered by the U. S. Post Office Department.

### INDUSTRY SIFTINGS

GAIN IN CAPABILITY OF 7-PERCENT last year was a key achievement noted in the "1960 Year-End Summary of the Electric Power Situation in the U. S.," distributed by EEI. The Institute's annual survey shows the industry has more than 40-million kilowatts of new capacity on order and scheduled for service, about 85-percent of which is to be in service by 1963. Scheduled to be added in '61: about 12.5-million-kw.

IN RECENT RATE CASES Central Illinois Light Co. has applied for a general increase that would produce \$3.25-million more in revenue, add about 5-cents a day to the average bill for residential customers. (The utility's income available for shareowners dropped \$675,000 in '60.) P.S.Co. of Indiana, which won 94-percent of requested increases in a decision early this year, was turned down on a request for \$2 and \$2.50 service charges for urban and residential customers, respectively. In making the ruling, the Indiana Commission asked whether a fee or charge could be made a condition prece-

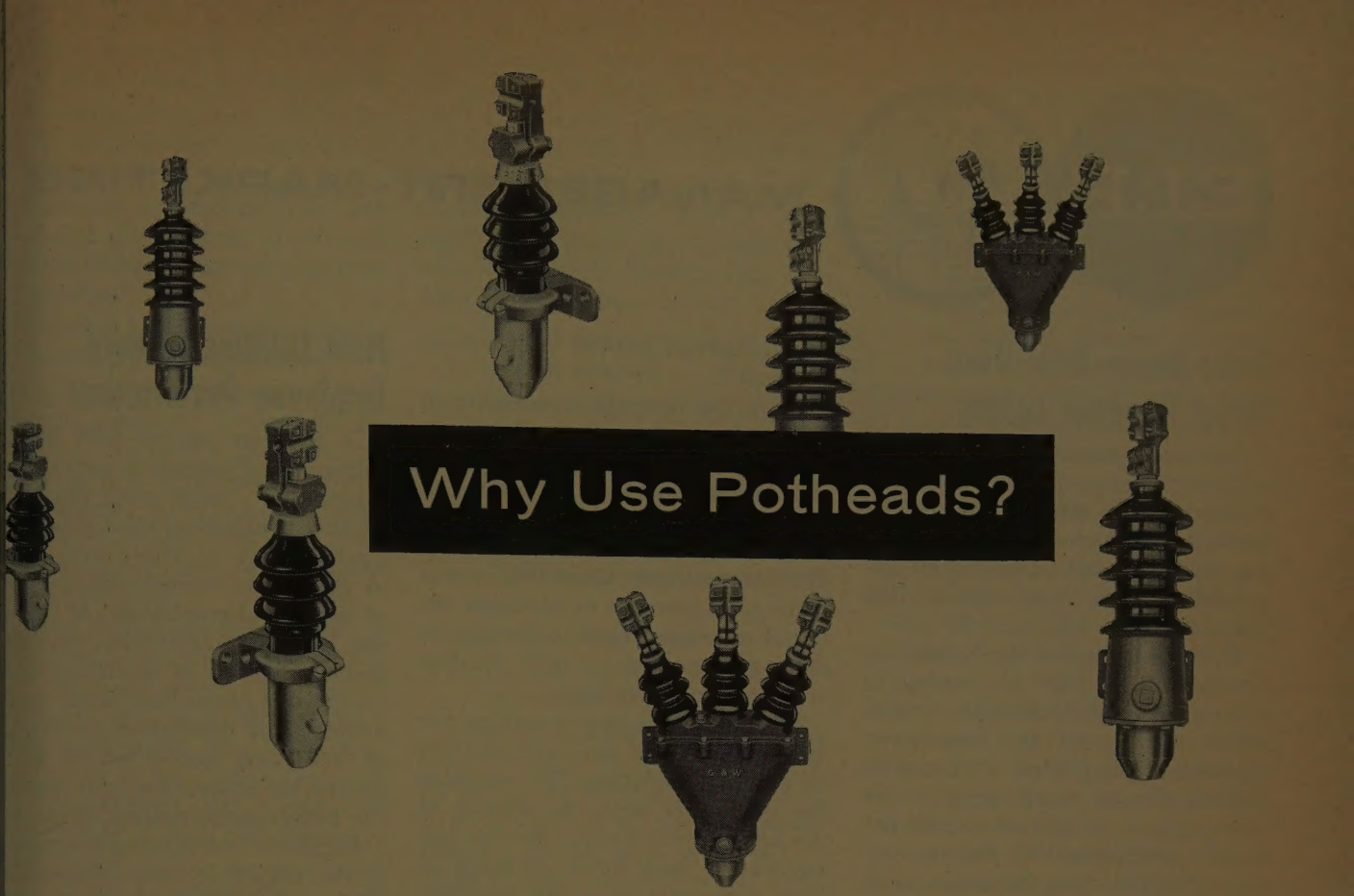
dent to obtaining service when the company has a legal obligation to furnish service.

FORGET RATE REDUCTIONS?--Most customers will soon after they get 'em. But, reports the EEI Public Relations Committee Newsletter, Wisconsin P.&L. took steps to keep a \$1.2-million rate cut on customer minds--using direct mail, publicity releases and newspaper advertising to emphasize the fact that the reduction was a reversal of the trend of rising prices. (On the other hand, the pennies-per-month involved in a recent Niagara Mohawk Power Co. rate boost was stressed for customers and appliance dealers through bill inserts and informative folders.)

INFORMATION ABOUT COMMUNISM--Utility company employees can be expected to want more of it, either through company-sponsored information programs, or on their own. For example, Louisiana P.&L. Co. employees acting on their own free will have been listening to recorded speeches available through the Christian Anti-Communism Crusade (P.O. Box 6422, Houston 6, Texas). Following exposure to the six-session EEI Information program "The American Economic System," employees of the Houston L.&P. Co. expressed interest in more sessions on Communism, socialism, the USSR.

UNCONVENTIONAL GENERATION--NEMA recognizes its newly emerging role in the power industry by setting up a separate Association section to consider research and products (and initiate standardization of terminology, testing, etc.) in such areas as magnetohydrodynamics, fuel cells, thermoelectrics, thermionics, batteries, photovoltaics, photochemicals. Affiliated with the new section now are 22 NEMA member companies. (MHD is "most promising" of these "exotic" methods, Philip Sporn says, revealing that a group of industrial leaders recently witnessed a test in which 80-kw were generated for 10-seconds.)

NEW RESIDENTIAL SERVICE PLAN--Kansas G&E Co. has announced an out-of-warrant service plan including preventive maintenance checks each spring and fall for customers' heat pumps for five years after installation.



## Why Use Potheads?

**Because** — Potheads are the best way yet devised to terminate cables.

**Why?** — Only a pothead provides a grounded, hermetically-sealed metallic housing over the bare cable for effective protection against weather and corrosive atmospheres. Extra insulation between conductors and to ground is built up in potheads with dielectric materials of high strength, amply protected by the housing against deterioration. Mechanical seal of cable to pothead is excellent, making it easy to secure cable termination solidly.

**True** — There are other methods of terminating a cable. These are good and may be entirely adequate for certain conditions. But only a pothead has the extra characteristics that pay off in best service over the years.

**What Extras?** — Potheads are best because they have extra features to enhance life, reliability, and continuity of service, while requiring minimum maintenance. They have extra stamina, too, for the difficult situations and for emergencies such as switching and lightning surges, corrosive salt and industrial fumes, and unusual cable-support problems.

**G&W** — Standardized potheads covering 80 percent of uses are available for fast off-the-shelf delivery. Other potheads are available for special uses or can be designed for even the most unusual cases. Other types of termination are also available. Write G&W about your problem or contact your nearest sales representative. Data is available on both standard and special-use potheads upon request.



### G&W ELECTRIC SPECIALTY COMPANY

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Canadian Mfr. • Powerlite Devices, Ltd. • Toronto, Montreal & Vancouver

*superior quality standards — inspired specialized design*

A61-1



## MANAGEMENT-MARKETING

### Rates Down—New Uses Offset Revenue Losses

Increased use of electric energy—lower rates . . . lower rates—increased use of electric energy. It's the key success formula in marketing kwh—all too often taken for granted within and outside the industry.

Everybody inside the utility industry knows how it works, of course, though—customer needs, utility practices and regulatory schedules being what they are—it doesn't always work in just the same way. A couple of current examples are interesting for the way they illustrate this fortunate marketing chain reaction:

Arizona Public Service Co., for one, in proposing rate reductions recently, started out with a dual purpose—to "aid in the commercial and industrial growth" of Arizona business . . . and at the same time to help in "simplifying and modernizing the pricing structure in this area of the company's service territory."

The proposal, approved by the Arizona Corp. Commission and effective since Feb. 9, introduces adjustments which will bring about a savings to commercial and industrial customers amounting to approximately \$400,000 annually. The new schedules are an important step, the utility notes, toward the eventual simplification of the complex rate structure in the area which resulted from a series of acquisitions and mergers dating back many years.

Commenting on the proposal, E. T. "Eddie" Williams, Arizona commission chairman, stated, "The company believes that the fairly substantial reduction in electric revenue which will initially occur will be more than made up by the increased use of energy that will result. In short, these are developmental rates which the company is confident will aid in the commercial

and industrial growth of Northern Arizona."

Since the new rates could result in increases to some customers, each customer is being given the election of adopting the new schedules in substitution for those under which they are presently receiving service. Consequently, those who would receive an increase on the new optional rates may elect to remain on their present rates until further order of the commission.

The Arizona utility is making the most of the rate cuts in bettering its customer relations. To acquaint the customers with the details of the adjustment, Public Service has assigned a "task force" of some 15 sales personnel to make personal contacts with the nearly 5,000 customers involved.

This personal contact is also giving the salesmen an opportunity to survey the customer's equipment and to make recommendations for follow-up sales calls, the utility notes.

John L. Liecny, the Arizona utility's treasurer, points out that over a period of time, the increased use of electrical energy will more than offset the initial revenue loss.

In California, the Commission periodically (annually for areas in Pacific G. & E. Co.'s territory in northern Cal.) orders customer density surveys of fast growing areas—the result: some customers are shifted to lower rate zones.

On Feb. 2 this year, lower rates  
(Continued on page 25)

### How Utilities Reward Employee Performance

In the new year of 1961 the performance of people is getting more attention . . . and more than ever. Most organizations take a new look periodically at ways and means of rating and recognizing the work of individual employees; at the onset of 1961, however, especially among a group of Southern utility companies, there has been notable evidence of dedication to the goal of achieving better effort in the future by measuring and marking the better performance of the people.

Employee performance appraisal is the target of new programs at Mississippi P. & L. Co. and at Alabama Power Co., for example. At Duke Power Co. and the Florida Power Corp., new award programs are now in effect.

Mississippi P. & L. instituted a new Employee Performance Appraisal System last Nov. 1, replacing a previously used Merit Review Procedure. According to the utility Vice-President C. E. Jones:

"One of the major changes incorporated in the new system is the separation of the performance appraisal and the merit increase salary. These will now be handled through separate procedures at different times."

Mr. Jones stated that the new system, which eliminates numerical grading, has been under consideration for some time and was formulated after much discussion and study, including devoting two percent management conferences to discussion of the subject.

Designed to help employees improve their performances, the appraisal system will:

1. Provide a history of employment and job performance.
2. Help employee to improve himself.
3. Aid in determining if employee is in job best suited to his abilities.



Identify employee's strong or weak areas and training needs. Let employee know where he stands and what is expected of him.

Identify employees who are doing outstanding work and also those whose work is sub-standard.

Provide a medium for a supervisor-employee interview.

Three types of employee performance appraisal forms will be used. One will be for probationary employees (for all employees hired for regular jobs); one for non-supervisory employees; and the third for supervisory and professional employees.

At the Alabama Power Co., a "Employee's Performance Review" was established Jan. 1 as an important step in a Management Appraisal Program, recently formulated in the utility's employee relations department "to widen the opportunities of each individual."

Employee progress reports, heretofore made by supervisors each year on employees under their supervision, have been revised to include many factors bearing upon employee's job performance and compare with the Alabama Power Company.

In a letter to officers, department heads and supervisors, H. Neely Henry, executive vice-president, said, "Planning for the future personnel requirements of the Company is one of our most important programs."

In stating the objectives of the new reports, Mr. Henry said, "The anticipated growth of our Company, coupled with personnel changes which will be necessary due to future retirements, places a challenge and responsibility on each supervisor for the maximum development of each employee under his supervision. Consequently, changes have been made in our Progress Report system to enable the superior and the employee to better understand their work relationships, responsibilities and needs for individual improvement." Performance reviews will be completed for each employee annually near the employee's anniversary date.

The performance review will provide each employee with the

opportunity to learn how he is getting along on his job in terms of what is expected for efficient performance. It will help answer the questions in the mind of every conscientious employee—"How am I doing?" "What can I do to improve?" The Employee's Performance Review includes these factors:

1. Knowledge of job
2. Quality of work
3. Quantity of work
4. Dependability
5. Safety
6. Job attitude
7. Ability to get along with others
8. Contribution to Company reputation
9. Personal appearance
10. Demonstrated capability for advancement

A newly established awards program at Duke Power Co., the utility's Pres. W. B. McGuire explains, is an indication of the Company's interest in its employees and its pride in their achievements. These qualities have long been exhibited by the man for whom the program is named, he said.

The awards program honors W. S. O'B. Robinson, Jr., who is consulting general counsel, a director of the company and a trustee of the Duke Endowment. As many as three awards may be given each year. Each award consists of five shares of Company stock, an engraved watch and a certificate of award. Any employee of the Company, including employees of Mill Power Supply Company, is eligible for nomination, and selection will be by an Awards Committee appointed by President McGuire.

Achievements for which the awards may be given were outlined by Mr. McGuire. They are:

1. Outstanding contributions to public service, customers' service or improved practices in our relations with the public.
2. Outstanding judgment, courage, self-possession or ability in an emergency.
3. Outstanding action or service to prevent injury, loss of life or prevent damage to or loss of property.
4. Outstanding contributions to the field of human relations,

employee-management relations or any of the allied fields.

5. Outstanding contributions to the design, construction, operation and maintenance of the plant or equipment.
6. Noteworthy papers, articles, inventions, achievements or suggestions in the field of sales, engineering, finance, accounting or other company activities.

Nominations, which can be made by any employee, must be in the hands of the Awards Committee not later than January 31 of the year following the year in which the achievement is accomplished. The first President's Awards Dinner will be scheduled early in 1962.

Emphasizing the key role each employee plays in Florida Power Corporation's relations, Vice-President J. K. "Pat" Flanagan recently announced a contest as part of the 1961 public relations program in which employees may win big, valuable prizes.

"Because of President W. J. Clapp's awareness of the ever-increasing importance of good customer and public relations and his efforts to make Florida Power Corporation a better company for customer, stockholder and employee," Mr. Flanagan said, "we have established the President's Public Relations Awards for individual employees, and the President's Good Neighbor Service Awards for divisions and districts."

Beginning with the first quarter of 1961, quarterly prizes of \$100 U. S. Savings Bonds will be awarded to two individual winners of the public relations Award. The two annual prizes will be 10 shares of FPC common stock, or its equivalent value in cash, or an extra week's vacation with pay and all expenses paid for two for a week at St. Petersburg, Florida. The awards are divided into two classifications, one for contact people and one for non-contact people. The following activities will be considered by the judges:

Speeches, film showings, civic activities, good neighbor visits, personal public relations, etc.

The other contest in the 1961 public relations program based on the overall public relations activities of all employees in the division or district.



## The Convergence of Public and Private Debt

In the article "An Economic Forecast for 1961—and the Years Ahead" it is pointed out that in the next five years "the accumulation of private debt will threaten to overwhelm the American economy."

The trends of the net private debt, of Federal, State, and Municipal debt, and of Federal, State, and Municipal spending, are shown on the chart, and support the statements that with one exception the growth rate of these items has been far in excess of the rate of growth of any of the indices used to measure the business and the industrial expansion of America. This of course is the fact that makes the situation dangerous.

The one exception would appear to be the net Federal Debt, which in the post-war years shows only a slight rate of increase.

Now John A. Beckett, assistant director of the budget, points out that because of hidden commitments, the slow rate of growth of the net Federal Debt is illusive.

In an article that appears in the December, 1960 issue of *The Controller*, Mr. Beckett discusses what he calls "The Facts of Federal Fiscal Life." Since only by knowing the facts about the difficulties faced by the American economy is it possible for those in authority to provide remedial measures, the people of America owe to John A. Beckett a great debt of gratitude for the facts and figures he so courageously has cited in his article.

Following are excerpts from this careful and detailed study:

"There are many programs which today are accepted as normal, necessary, inescapable programs of the Federal Government and which are due to cost much more in the years ahead than they do now. With growing population, increasing urbanization, and accompanying increases in the complexity of social life, some present programs inevitably will increase in cost. Such built-in increases in 1961 alone came to over \$2-billion; for 1962, there are already built-in increases of over \$1-billion more.

"The Government is committed in the future for many other costs. For example:

"Merchant Marine subsidies will cost \$4.3-billion.

"Future Federal contributions for public housing will cost \$5.4-billion.

"Federal civil public works projects already started will cost \$7-billion after 1961 to complete.

"Interstate highway program may cost \$30-billion or more to complete.

"These and other obligations, along with huge unexpected balances in our defense program, amount to \$100-billion of future commitments."

Other commitments include:

"Accrued military retirement \$38-billion—and this is not funded.

"Accrued civil service retirement \$28-billion above present fund balances.

"Veterans' pensions, and other benefits amount to another \$300-billion.

"All of these are obligations we have assumed for past services."

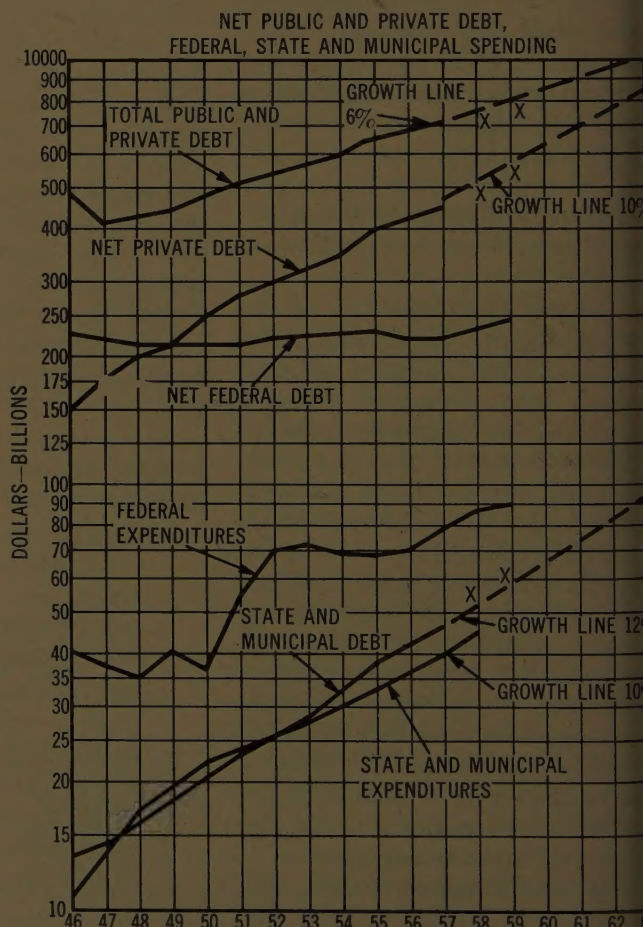
Mr. Beckett then says:

"Now if you take the \$288-billion of national debt, add the \$100-billion of commitments for going programs, and about \$370-billion for retirement pension and benefit programs, you come to the astronomical total of over \$750-billion—the size of our national mortgage on the future.

"This is not fancy, this is fact; a fact of federal fiscal life—albeit not a very widely recognized fact—with which it would serve more Americans to be familiar.

"Added to the already built-in growth of federal expenditures there are insistent demands for new or expanded programs—an almost insatiable demand."

Space does not permit further quotations, but the article shows that in the years ahead a sharply rising Federal Debt will accompany the sharply rising State and Municipal Debt and the sharply rising Private Debt.



This convergence of Public and Private Debt, if unchecked by conservatism in public and private lending, appears likely to create an economic situation which will lead to an uncontrolled inflation. As a result, when this conflagration is brought under control, the economy will be found operating with a vastly inflated currency of dollars whose purchasing power greatly will have been depreciated. To quote Mr. Beckett once more—"There is no tolerable alternative to conservatism in federal finance."

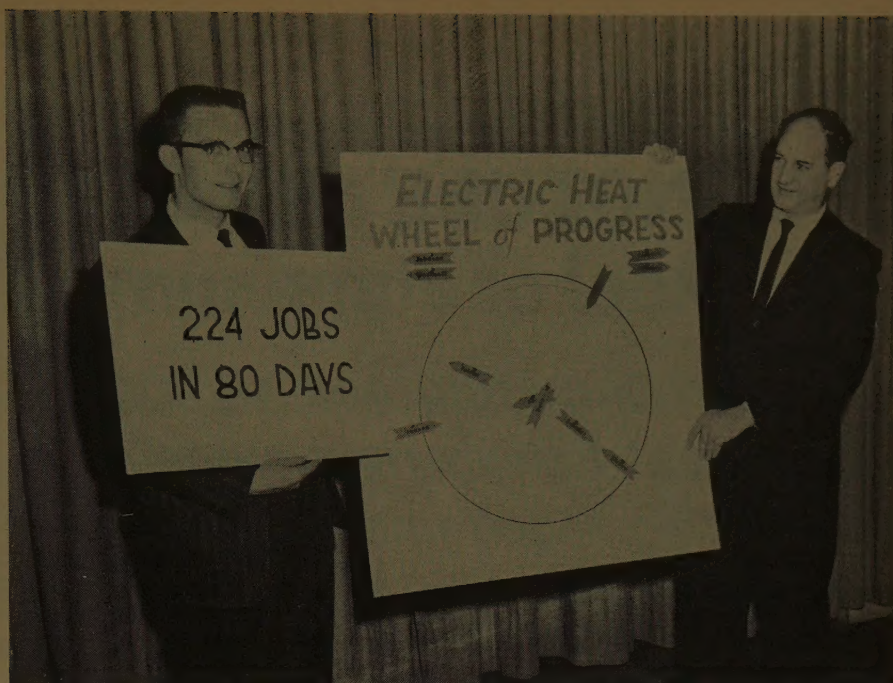
"Conservative growth may have some disadvantage, but this, I submit, is the cost of freedom."

### Power Rates—(cont. from p. 22)

Due to rezoning reduced billings to PG&E customers by \$497,100 compared with \$496,910 for 1960). Reductions for 25,072 electric customers will amount to \$323,100 per year, of which \$274,300 will be for residential customers and \$48,800 for commercial. (For 21,959 electric customers, charges will be reduced \$174,000, of which \$165,600 will be cut from bills of residential customers and \$8400 from charges for commercial users.) The surveys were made in conformity with decisions of the Commission which eliminate city boundaries as the major factor in determining rates. Customer density is the chief consideration in establishing rates, whether the area is inside or outside an incorporated city, since the cost of providing service is reduced proportionately as customer density increases.

In many instances annexation resulted in change either gas or electric rates in areas with customer density equal to that of the city to which it was annexed, since the areas had already been rezoned to lower rate levels. Rezoning was carried out by enlarging special rate areas, creating new special rate areas and changing the zoning of some areas newly developed on the boundaries of cities.

The key factor in maintaining profitable marketing while undergoing this periodic rate revision is, obviously, the fact that "the cost of providing service is reduced proportionately as customer density increases."



"Electric Heat Wheel of Progress" used in recent Kansas P. & L. Co. campaign, which netted the utility 224 new electric heating installations in 80 days, is held by Dana K. Anderson, residential sales coordinator, and Lee R. Nicholson, director of new business.

## Electric Heating Jobs: How to Sell 3-a-Day

The Kansas Power and Light Company recently completed an 80-day electric heating campaign which resulted in the sale of 224 new installations, reports Dana K. Anderson, KPL's residential sales coordinator.

The Company's new business representatives averaged about three electric heating sales daily during this campaign.

The sales plan was based largely on incentive among the salesmen. Beginning at the hub of a spoked wheel (see photograph), the representatives worked outward toward the rim on assigned spokes. Each spoke contained eleven sections with each section representing one electric heating installation. The sections also brought progressively higher bonuses, with the first section worth \$2.00 and the last or outer section, worth \$50.00.

When a sales representative had reached the outer rim, a drawing was held and he became eligible to move down the unfinished spoke of the representative's name he drew, picking up any bonuses not claimed by the spoke's owner.

Electric heat sales were primarily home installations with commercial jobs ranging from a small remote

natural gas pumping station to a large, 65,000 square-foot school.

"The success of this campaign proved to us that there is a big market for electric heat in this area saturated with 35¢/mcf commercial and 45¢/mcf residential natural gas," said L. R. Nicholson, KPL's director of new business.

The Kansas utility now has more than 500 total electric heating installations in its service territory.

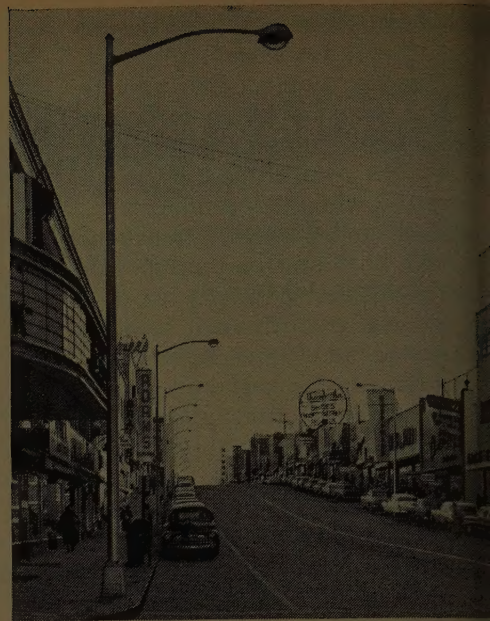
### Beg Your Pardon

In the Feb. 1 issue of EL&P, in the "Annual Forecast" feature, these errors occurred: On p. 42, nomenclature for chart at lower right was transposed; on page 57, Number of Customers increased to 59.8-million; on p. 58, the figure for electric construction budgeted by the Dept. of Interior is arrived at on a total cost basis, including land and land rights, engineering, etc.; also on p. 58, the amount budgeted by the U. S. Corps of Engineers for generating facilities in FY 1960 is \$134-million, rather than \$143-million. In this Feb. 1 issue on p. 34, a reference to "companies testing facilities to handle 75,000-volts" should be 750,000-volts.

Note: Corrections were made before the feature was reprinted. Copies of reprint are still available.

# MONOTUBE POLES in steel or aluminum

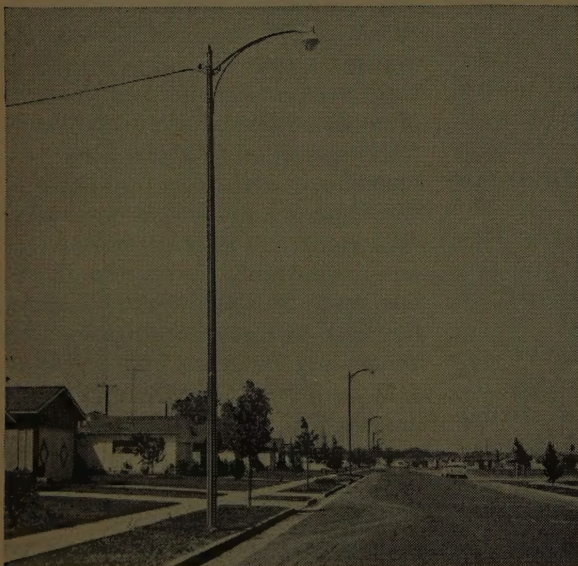
*... engineering and styling  
to meet today's rigid outdoor  
lighting requirements*



**Business District Lighting**



**Highway Lighting**



**Residential Lighting**



**Area Lighting**

## UNION METAL

THE UNION METAL MANUFACTURING COMPANY

Canton 5, Ohio

Brampton, Ontario

*Monotube Engineered Lighting Poles*



## Giant Power Grid

A federally-dominated giant power grid, as envisioned by the late Harold G. Clarke and Olds in the 1930's and still a goal of a crusade by his disciples, has long since passed the dream stage and is moving grimly close to reality. Those who have refused to take seriously the possibility that such a nation-blanketing form of centralism could materialize in this country, will do well to take an unbiased look at the latest collapse toward that very end.

A five-state, all-federal transmission system to carry to preference customers the 1.2 million kilowatts of power to come from hydro plants on the Colorado River Storage project, has been approved at the high-administrative level. In all likelihood it will be provided for, in whole or in large part, by Congress. It is a key link in the giant grid. With its approval came rejection of an offer by five power companies in the area to build most of the needed transmission lines and wheel power to delivery points. Under the companies' offer the government would need to spend only about \$47 million for backbone lines to connect the major powerplants to the project. Instead, it proposes to spend some \$157 million for about 2,000 miles of line to connect the powerplants and to establish 14 delivery points in Wyoming, Utah, Colorado, Arizona and New Mexico. The reason: It will enable the government to sell the power to preference customers at a slightly lower price.

The fact that approval of the all-federal system was a last-minute act of outgoing Interior Secretary Fred C. Seaton, who was considered a supporter of the Eisenhower "partnership" policy, caused only a mild flurry of eyebrow-lifting in Washington. The move, it was shrugged off, undoubtedly would be taken anyway by incoming Secretary Stewart Udall. It was strongly recommended in a lengthy memorandum of November 30, 1960 from

Reclamation Commissioner Floyd Dominy, and would doubtless get a hefty boost from the new Assistant Secretary in charge of water and power, Kenneth Holum, a public power enthusiast.

The Dominy memo, approved in total by Seaton, also called for: establishment of the Bureau's "Financial and Power Rate Analysis of September 1960" as the basis for setting rates for the project power; and negotiations with each private utility to determine what interconnections the Bureau might obtain between the federal system and that utility's system.

The rate analysis shows that the payout requirement of the project's authorizing act can be met by power revenues based on average rates of: 6 mills per kw-hr for firm energy; 2.5 mills for nonfirm energy; and \$15.00 per kw-year for peaking capacity. "If the utility proposal is accepted and power sold at the same rates as under the all-federal system, the project could not meet the payout requirements . . ." Dominy said.

He pointed out that the Bureau's study covering an 86-year period indicated that in order to provide the same total irrigation assistance (\$952 million) to the states by the year 2049 as under the all-federal system, and maintaining the above rate levels for nonfirm energy and peaking capacity, an average rate of 6.57 mills for firm energy would be required under the utility proposal. This, he said, would result in an average annual added cost to preference customers of about \$2.9 million. Dominy continued:

"Although the utility proposal would result in the United States saving construction and operation and maintenance costs, these savings, together with allowance for assumed federal income taxes foregone and imputed interest costs on the irrigation allocation of storage units, are less than the increased costs of power. This situation exists

even under the condition of selling power at 6 mills under federal construction and 6.57 mills under the utility proposal."

Dominy quoted the policy laid down by Congress in authorizing the project, which directs that the power be marketed, so far as possible, through facilities of electric utilities, "provided, of course, that . . . consumer power rates are not adversely affected." Under the utility proposal, Dominy held, such rates would be adversely affected, so the system should be all federal.

Getting down to end results, it is obvious, even assuming that the Bureau figures are reasonably realistic, that the degree to which the average preference customer's monthly electric bill may be "adversely affected" under the utility proposal must be a piddling one. But in the prevailing atmosphere of indifference to long-range implications, the enormity of this so-called "saving" to a preferred minority, as a factor in spreading the federal handout sickness to epidemic proportions, is uncomfortably clear.

The significance of the Colorado Storage Project grid was recently summed up in a speech to the Midwest Electric Consumers Assn. by Assistant Reclamation Commissioner N. B. Bennett, who, incidentally, put a bold imprint on the Dominy memo. As a result of that grid, said Bennett, "all major systems west of the Mississippi River, with the exception of a large part of Texas, will be interconnected and will be able to function as one power pool."

Bennett also declared that with certain modifications expected to be accomplished by mid-1963, "it will be possible to have an interconnection from the Pacific Northwest, all the way to the TVA system, including some systems on the Gulf Coast, and extending north of TVA to the Virginia, Maryland, and Pennsylvania systems on the East Coast."



**FY '62 BUDGET RE ATOMIC ENERGY**, offered by the Eisenhower Administration, kept spending at about the '61 budget level—\$2.68-million. Funds for reactor development are off slightly, from \$422.4- to \$437.5-million. In retiring Pres. Eisenhower's message accompanying the budget, as presented to the Congress, were these words: "The development of civilian atomic power is being carried forward intensively. Expenditures of \$250-million estimated for 1962 will support major development efforts on seven reactor types, and preliminary studies and experimental work on a number of other reactor concepts. The breadth and scope of our technology in this field are unmatched in the world.

"The next 18 months will see further advances toward our long-term objectives of making atomic energy an alternative and economic source of power at home and abroad. The total number of major Government-owned experimental power reactors in operation will increase by 5 to a total of 10, and the number of power reactors operating in public and private utility systems will increase from 3 to 10. The 1962 budget proposes additional funds for cooperative arrangements with private and public power groups in undertaking atomic projects which would further the objectives of the program."

**HTGR FUEL DEVELOPMENT** has made "very significant progress," an AEC-sponsored information meeting at San Diego, Calif., was told recently by Dr. Robt. B. Duffield, manager of the high temperature gas-cooled reactor (HTGR) project under way at General Dynamics Corporation's General Atomic Division. He reported particularly notable performance in irradiation testing of graphite matrix fuel compacts and in the development of coated fuel particles for use in reactor fuel materials. (For more details, see conference report on page 47.)

**HUMBOLDT BAY PLANT CONSTRUCTION** work has been under way for about a month. In a brief ceremony marking the first concrete pouring to form the underground caisson for containing the reactor, PG&E's Pres. Sutherland asserted this confidence: "Putting uranium to work safely and economically has been challenging scientists for a generation and our utility industry for a decade. The industry has solved the problems insofar as safety is concerned, but no one as yet has been able to make electricity with atomic fuel anywhere in the United States as cheaply as it could be done with gas, oil, or coal, or with falling water. We expect this will be accomplished in Humboldt County during this plant's life."

**HIGH POWER DENSITY** boiling water reactor project, now under contract, involves \$500,000 research and development costs reimbursable to Consumers Power Co. and up to \$3,710,916 in R & D costs reimbursable

to General Electric—the latter subject to an upward escalation with a ceiling of 10-percent.

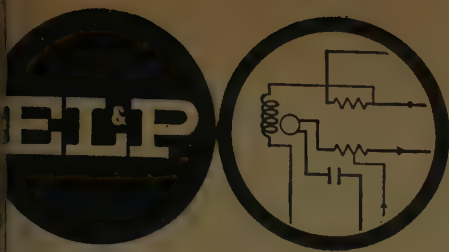
**COST OF A-POWER IS FALLING** quite fast, IAEA Director General J. Sterling Cole advised the UN in his annual report for 1960. "It is falling faster than that of conventional power, but from a greater height and it is unlikely that the two curves will intersect until the latter half of the 1960's."

**WORLD'S MOST POWERFUL** nuclear plant—580 megawatts—will be under construction in Great Britain next month. The UK's Central Electricity Board ordered the \$155-million plant from English Electric Babcock & Wilcox and Taylor Woodrow Atomic Power Group, which is now completing the world's first 500 megawatt atomic power plant at Hinkley Point in Somerset. The larger unit, to be finished by 1966, will be located at Sizewell in Suffolk. The UK says it will be the most compact yet built . . . and it will produce power at a lower cost than any other station under construction.

**DIRECT FAULT INDICATION** is "desirable," safety officials at the UK's Calder Hall Nuclear Power Station confirm. Also, the principle of employing two different types of trip initiation for any fault condition has been justified, a 4-year report on the Station's operating experience shows. For example, a reactor trip operated directly by a coolant flow measurement has been installed to supplement the original indirect protection against failure of coolant provided by electrical indication of circular rotation and excessive fuel element temperatures.

**A NUCLEAR EXCURSION AT SL-1** in the accident of Jan. 3 is indicated by the presence of neutrons in metallic objects recovered from the reactor building, definitely proving they were emitted during the chain reaction. Establishment of conclusive evidence was delayed for about two weeks, largely because virtually all fission samples were contaminated with gross fission products. Neutron-activated isotopes of the elements of copper and gold, found in subsequent radiochemical activation analyses of the metal samples, indicated the uncontrolled chain reaction definitely. (Shortly after the accident, the AEC wired all reactor operators licensed by the Commission to get a comprehensive picture of "certain aspects of reactor operation . . . and to assure that needed steps are taken during maintenance operations to avoid an inadvertent criticality.")

**A DRIVE MODIFICATION PROGRAM**, performed by Commonwealth Edison's Dresden reactor as a part of General Electric's normal product service, is replacing parts of the drives where the hardness and wear-resistant properties of 17-4 PH stainless steel are not essential, utilizing alternate metal alloys



## ENGINEERING-OPERATIONS

### Industrial Power Distribution Course Available

The Industrial Electrification Council has released its Industrial Power Distribution Course for sale to electric utilities and others. Its primary purpose is to train industrial plant personnel in the selection of electrical systems and components, to better appreciate the latest equipment, methods and techniques, as well as the many advantages of good electrical distribution. It will also be of value in familiarizing industrial power sales engineers, equipment salesmen, jobbers, distributors, and contractors with industrial electric power distribution systems.

Designed for presentation in ten 2½-hour demonstration-type lectures, the course includes: basic components of a distribution system, one-line diagrams, voltage selection, voltage regulation, power factor improvement, conductors, electrical estimating, protective devices, control of motors and other power use equipment, preventive maintenance, system planning, selection of primary voltage, transformers, unit substations, lightning protection and overvoltages, estimating cost of medium voltage installations, relay selection, system grounding.

The course was developed and field-tested by West Penn Power with highly satisfactory results.

### Iron Cement Seals Duct Joints

Sealing duct joints at Unit No. 5 of Duke Power's new Allen plant, scheduled for completion in July, is being accomplished with an iron cement. The joints are uniformly sealed and rendered air and gas-tight by this method rather than by welding or use of gaskets.

The iron cement is being used where duct flanges connect either with each other, or with other equipment such as preheaters, fans and precipitators. Some 80 duct joints with a total length of perhaps 5000 ft have been sealed with Smooth-On No. 3, an iron cement made by Smooth-On Mfg. Co.

### More Lines, Faster, By Helicopter

A Hiller 12E light utility helicopter picked up a 100-lb reel of cable and flew over poles along Pennsylvania Electric right-of-way laying 3000 ft of ¾ in. aluminum cable directly on the crossarms. The job took less than nine minutes. Construction officials estimated that it would have taken ground crews a full day to string the same stretch.

Meanwhile, a Sikorsky S-58 helicopter picked up a 75-ft-high aluminum tower in an Appalachian Power assembly yard and flew it to its transmission line

site 1.2 miles away. It was pinpointed to its concrete footing, guyed and released in less than ten minutes. The tower is part of an 18-mile, 138-kv line being built by Appalachian Power to the site of its Smith Mountain hydro dam on the Roanoke River.

According to Philip Sporn, president, American Electric Power, "... there is a good prospect that the towers—even for a 345-kv line built of aluminum and specially designed to carry mainly the vertical components of load and to carry their transverse load by guying — will be completely assembled on the ground, carried in that state to their final locations, and placed on the footings, all by helicopter."

### NYSE&G Expands Communications System

Expansion now under way of New York State Electric & Gas's two-way mobile radio network will feature a transistorized mobile system which will be one of the largest of its type in the nation. Eighteen two-way base stations are being provided to replace the existing two-way system. Installed are 29 remote-control and 315 low band mobile radios.

Transistorization plays a key part in the plans for upgrading the system to meet the needs of the decade ahead, according to J. R. Stover, NYSE&G's chief of electrical engineering. "Transistor-equipped mobile radios have the ability to reduce battery drain in our vehicles," he said. General Electric Co. is under contract to provide the utility with complete installation and maintenance of two-way radio service for the next ten years.



Six-ft-high letters in white lime on a background of coal proclaim the safety record achieved by the Edge Moor Power Station of Delaware Power & Light. The message, over 100-ft long, was written by a group of employees on this 75,000-ton outdoor-storage coal pile and is plainly visible from the main building of the power station and from aircraft which pass overhead. Since May, 1952, there have been no chargeable accidents in 2 million manhours. Installation in background is a coal dumper.



## Fork Trucks Cut Costs Increase Storage Space

Introduction of modern materials handling methods has resulted in an estimated 25 percent savings in operating costs and has increased usable storage space at California Electric Power's General Service Center in Rialto, California.

The center consists of a large general storeroom, an assembly shop and transformer repair facilities. Indoor storage area is 33,600 sq ft, while outside storage, excluding the pole yard, contains about 25,000 sq ft. Additional outdoor storage space is available when required.

Warehousing of transmission and distribution equipment—pole line hardware, cross arms, cable, transformers and associated products—functions around a fleet of six gas-powered fork trucks.

A joint study of equipment needs and operating procedures with representatives of Robert H. Braun Co., Los Angeles dealer for Clark Equipment Co., led Caletric to place in service three fork trucks in the general storerooms, two in the transformer shop, and one in the assembly shop. Two-wheel hand trucks and dollies were formerly used.



Clarklift fork truck at Highgrove Station can be fitted with special "crow's nest" tripod ladder when maintenance crew replaces bulbs in lamp posts which encircle station. This method of replacing burned-out bulbs has reduced man hours required and improved safety of operation.

A. J. Scott, general storekeeper, says that usable storage space has greatly increased through use of fork trucks which can double- and triple-tier pallet loads. Fork trucks have assisted in reducing handling costs and in achieving maximum handling efficiency.

Mobile handling equipment is used in every operation that involves lifting, intra-plant transporting and storage of supplies needed to operate the company's generating stations and major distribution facilities.

Success of the materials handling system is due in part to proper matching of fork trucks to various operating conditions. One fork truck of 3500 lb capacity and two of 4000 lbs capacity are used in the general storeroom where supplies such as pole line hardware, insulators, crossarms and electric cables are stocked. These trucks have adequate capacity to handle supplies but are not large enough to move heavy transformers and other generating plant equipment.

The handling, storage and loading of these heavy items is done in the outside storage area by a 10,000-lb-capacity Yardlift® fork truck. This vehicle also serves the transformer shop where units are moved from one phase of maintenance to the next and eventually are carried out into the storage yard.

One fork 4000-lb-capacity fork lift truck (Clarklift®) works at Highgrove generating station.

Here the truck takes equipment from ground level to second-story operating level up a 25-percent-grade ramp.

Formerly, supplies were hoisted by heavy capacity cranes installed for other purposes. Lifting loads of 4000 lbs or less with cranes rated at many times the capacity was an uneconomical method of handling incoming supplies, according to R. F. Cumming, station chief at Highgrove.

The fork truck at Highgrove can be modified to lift and transport motors and other generating equipment not suited for handling by forks. The fork truck manufacturer supplied a boom arrangement which can be quickly attached to the truck to hoist such loads.

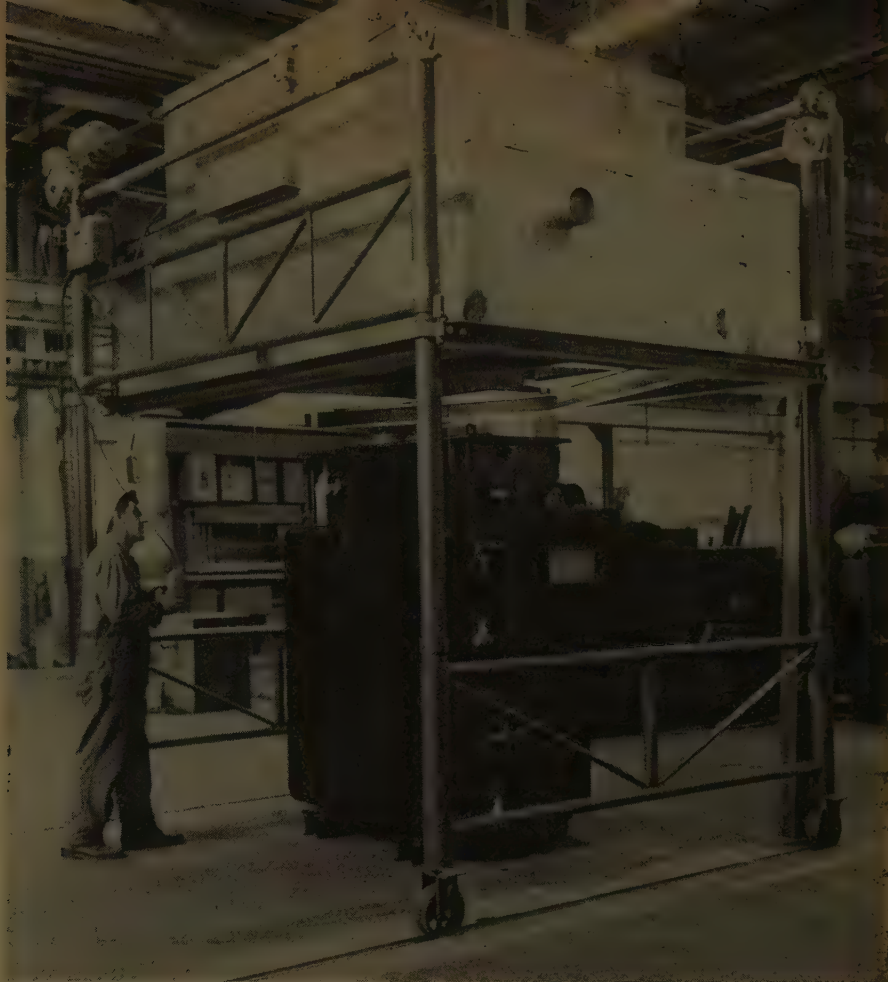
While the truck's main function is handling supplies and equipment, Caletric's maintenance personnel use it when replacing bulbs in lamp posts that encircle the station.

A "crow's nest" tripod ladder, made by the maintenance department, is easily attached to the truck's forks so a worker can be lifted 25 ft safely. Using the truck in this fashion has eliminated climbs on ladders from ground to lightbulb level. This method reduces the manhours required for the job while improving safety of the operation.

## Panel Truck Protects Meter Accuracy

A panel truck with an interior designed for carrying electric meters was recently put into operation by the Public Service of Oklahoma Electric Meter Dept. It holds up to 75 meters and keeps them from touching one another during transport.

Special baking oven used to bake weld area of network transformer. Oven is lowered over transformer cover to bake each coat of paint.



## TRANSFORMER REPAINTING REDUCED BY NEW PAINT, FIELD TESTS SHOW

*Five-year field test of a rubber-like paint assures VEPCo that network transformers will seldom have to be repainted. By-product design changes are suggested by inspections.*

By E. C. BAIN, Virginia Electric & Power Co., and  
C. G. S. LEWIS, General Electric Co.

A RECENTLY-DEVELOPED synthetic rubber paint has extended the time between required repaintings of a network transformer from six months to more than five years in a Norfolk, Virginia vault of the Virginia Electric & Power Co.

During 1959 a network transformer was removed from the vault after a five-year, "in-service" paint test. While five years is not a long time for most network transformer paint to last, it was unusually long for this

particular vault. Corrosive conditions were such that it had been normal procedure for VEPCo to remove the transformer every six months for refinishing.

Most network service is not this severe, but corrosion seems to be a growing problem. Many cities are adopting salt or other chemicals to remove snow and ice. These chemicals are particularly corrosive when they are flushed into transformer vaults. Other areas with dry vaults don't have the corrosion problem, but they do have the need for a paint finish that will never have to be



Network vault in Norfolk, Va. being pumped dry prior to first inspection of special paint test after 1¼-year operation. Manhole was completely submerged before inspection.



Low voltage end of transformer during pumping for first inspection. Note water level line on side of vault.

maintained in the life of the equipment. For both of these reasons, the field test in Norfolk is particularly interesting.

#### Original Installation

Prior to the original installation in October 1954, laboratory paint tests indicated that this special paint was excellent on underground equipment. (Table 1.) In order to complete testing, it appeared desirable to gain actual operating experi-

ence under the most severely corrosive conditions that could be found.

Many of the utilities along the East coast have "problem" vaults but VEPCo had a particularly rough situation. (See Photos.) One of its Norfolk, Va. vaults was totally filled with brackish, tidal water 90 percent of the time. Total immersion would be bad enough, but there were intermittent times when the water level dropped and exposed wet surfaces to the air.

Adding to the already bad situation, was the fact that there was considerable surface drainage. Chemical waste ran down the alley and into the ventilating grating directly over the low-voltage throat.

In preparing a transformer for the test in this location, no changes were made except for the addition of the new rubber-like paint. Conventional galvanized steel hardware, conventional hand welds and conventional paint application were used. Instead of providing an undercoat on the bottom portion of the tank, two coats of this special paint were applied (Table 2.) Each coat was flowed on and baked individually.

#### First Inspection

At the time of the first inspection, the vault was completely submerged. After pumping the vault clear, the inspection team found that the unit appeared to be in good condition.

Rust spots had started to appear around the bolts holding the cover to the high-voltage terminal chamber and switch compartment. Apparently the paint had been scratched down to bare metal when the bolts had been tightened.

Near these bolts on the switch compartment cover, a large "bubble" had formed where the special paint had separated from the subway black finish. However, the subway black was providing good protection and no corrosion had started at this point.

A gray deposit had formed on the low-voltage end near the throat. It was apparent, however, that it was caused by surface drainage running down the side of the tank.

At the time of the inspection, the unit had been installed over twice as long as previous practice. Since the paint still looked pretty good, it was decided to continue the test.

#### Second Inspection

Shortly before the second inspection in August 1956, VEPCo had installed a sump-pump in the vault. This kept the water level down except for occasional flooding.

At the time of the inspection, the cover 12 in. of the transformer was standing in water. The upper surfaces were dry and surprisingly, appeared to be in better shape than during the first inspection.

Rusting was still apparent around the bolts on the terminal and switch covers. In addition, there was some staining at the liquid-level gages.

Despite the fact that the paint had stood up for almost three years, it was again decided to continue the test.

### Final Inspection

In June 1959, VEPCo decided to remove the network transformer and refinish it. It was taken to a storage area where it could be carefully examined by a paint specialist and a network transformer engineer. Corrosion of and around the hardware, which had been observed during previous inspections, appeared to have slackened. The protective cover over the pressure relief diaphragm was severely corroded, apparently to galvanic action. Corrosion had also taken place on one side of the low-voltage throat. This probably was brought about because it was not ordinary practice to paint the flat surface provided for cork gaskets. It had not been observed during previous inspections because the area was quite inaccessible in the vault.

The general condition of the tank was very good although some rusting had started over hand-welded seams. This condition was particularly noticeable in the area around the cover flange weld.

### Modifications Found Desirable

As tests progressed, it became apparent that modifications were desirable in applying the paint. For instance, because of discoloration in sunlight, it was decided to "sand-blast" the two coats of special paint between the primer and the subway black. At the same time, the formulation of both was changed to provide better adhesion. This prevented the blistering effect between the coats which was observed during the test.

It also became desirable to change the subway black paint so that it provided better resistance to ultraviolet rays. Apparently many network transformers were being installed and stored in the sunlight which presented somewhat new requirements.

### Design Changes Suggested

While the field test was primarily for the purpose of analyzing the performance of the new paint, several

"by-product" design changes were suggested as a result of the inspections. (Table 3.) Most of these changes fell in two areas:

(1) The necessity of using better hardware and corrosion-resistant accessory construction.

(2) The desirability of using welds that were smoother than the usual hand welds. In this category, it was also apparent that a better paint finish would have to be applied to the cover weld.

TABLE 1

| Accelerated Laboratory Paint Tests                                    |                    |           |
|-----------------------------------------------------------------------|--------------------|-----------|
|                                                                       | Former Std. Subway | Melaprene |
| Tide-Water<br>12-hr dip and out<br>95 C Saline; 95 C air              | 49 days            | 180+ days |
| Weatherometer<br>alternate exposure to ultraviolet, spray, heat, cold | 30 days            | 180 days  |
| Alkali<br>boiling caustic solution<br>8-oz sodium hydroxide per gal   | 15 min             | 2+ hr     |
| Salt-spray<br>standard ASTM test<br>No. B-117-54T                     | 1600 hr            | 7000+ hr  |

TABLE 2

| Comparison of Paint                                                   |                                 |
|-----------------------------------------------------------------------|---------------------------------|
| Three-Coat Old System                                                 | Five-Coat Test System           |
| 1. Primer (Red Lead Chromate)                                         | 1. Same                         |
| 2. Subway Black No. 1 (Phenolic Resin)                                | 2. Same                         |
| 3. Subway Black No. 2 (Phenolic Resin)<br>Plus Asphalt-Type Undercoat | 3. Same                         |
|                                                                       | 4. Melaprene (Synthetic-rubber) |
|                                                                       | 5. Melaprene (Synthetic-rubber) |

TABLE 3

| "By-Product" Design Changes Suggested by Field Test              |
|------------------------------------------------------------------|
| 1. All hardware changed to stainless steel or silicon bronze.    |
| 2. Projection welded studs (Nelson studs) eliminated.            |
| 3. All seam welds changed from hand method to machine type.      |
| 4. Cover weld given 5-coat baked system instead of air-dried.    |
| 5. Low-voltage throat changed to a painted grooved gasket seat.  |
| 6. Flush type liquid level gage replaced by magnetic type.       |
| 7. Protective cover on relief diaphragm given tank paint system. |

# ECONOMICS OF HIGHER DISTRIBUTION VOLTAGE

*Utilization of higher and higher distribution voltages to facilitate handling more and more load places prime emphasis on apparatus costs.*

By L. A. PEPPEY, Planning Engineer,  
Distribution Apparatus,  
Line Material Industries

**D**ISTRIBUTION voltage level will play an important role in planning for the increased loads of the future. It will be influential in the design, cost and operation of the system, and will have a direct bearing on the length of the feeders, feeder loads, distribution substation capacity, and continuity of service.

An increase in voltage can be justified in the following two ways:

1. Carrying more load for the same conductor size
2. Covering more distance

The economics associated with increasing the distribution primary voltage may be attributed to the well-known "voltage-square" rule. As an example, if the voltage of a distribution circuit is increased by a factor of three, the increase in area coverage, with the same percent voltage drop, would vary from approximately four and one-half to nine times the initial area coverage depending upon the geometric pattern of the load. A long narrow feeder would have a distance load pattern and would be able to carry nine times the load with the same percent voltage drop. However, in a compact area load, such as an urban circuit, the main concern would be to serve an increasing load in an area that is expanding in length and width. In this case, approximately four and one-half times the load could be served over an area increased by four and one-half times with the same percent voltage drop.

Table I was developed to illustrate both the distance and area coverage advantages of increased distribution system voltages. The advantages illustrated may be carried over into the number of feeders, substations, and the amount of subtransmission line required to serve the load.

## What About Apparatus Costs?

No discussion of higher distribution voltages would be complete without the mention of apparatus costs and their influence on the economic evaluation. The system basic insulation level (BIL) is an important factor, of course, and is influential in the apparatus costs.

The BIL for 15-kv class distribution apparatus is 95 kv and has been used as a standard for some time. A BIL of 125 kv has been employed for the 13.2/23-kv and 150 kv for the 20/34.5-kv wye, four-wire multi-grounded neutral systems. It is conceivable that with improved arrester characteristics, a BIL of 200 kv could be employed for the 26.5/46-kv and 250 kv for the 40/69-kv multi-grounded neutral systems.

Advancing technology will undoubtedly change equipment that we know today and may even reduce the over-all cost. To illustrate cost comparisons with equipment of voltage classification, three charts on present product planning were developed.

Chart I illustrates 200-kv BIL 26.5/46-kv system and points out the influence of insulation requirements.

Chart II compares the distribution-class arresters, with the intermediate arrester. The reduced BIL of the distribution system reflects considerable savings which can be attributed mainly to differences in arrester construction.

Chart III compares the distribution-class 100-ampere fuse cutout with the power-class 200-ampere unit. Again the reduced BIL of the distribution systems reflects considerable savings.

Contributions By Utilities

The electric utilities that have pioneered the higher distribution voltage such as 12/20.8 kv, 13/23 kv, and the 20/34.5 kv have contributed greatly to the knowledge of manufacturers of electrical apparatus. They have proved through experience and operating records that apparatus can be built to supply the necessary loads at an economic cost. It is through the objective approach, incorporating

reduced BIL's in the design of the system, that costs of higher voltage equipment will remain comparative to the costs of the existing lower voltage systems.

Reference—

See article titled “34-Kv Distribution—A Possible Future Necessity,” by H. L. Hess, Distribution Engineer, Public Service Company of Indiana, Electric Light & Power, Dec. 15, 1956.

Pros And Cons Of Higher Distribution Voltages

Advantages claimed for higher distribution voltages are many, but could be broadly classified into three groups. These groups are:

- 1. Reduced maintenance costs. There will be a reduction in the number of circuit breakers and associated equipment as the number of feeders and substations are reduced.
- 2. Improved esthetic appearance. With few feeders required to serve a given load, congestion on the poles will be reduced. In many cases this may reduce the possibility of going to an underground system because of public pressure.
- 3. Reduction of the system costs and losses. Larger loads may be served from the higher voltage circuits having improved voltage regulation. The reduced

system losses could be considered released system capacity during the times of peak loads.

Along with the advantages, there are disadvantages frequently mentioned, such as:

- 1. Hot-line work or de-energizing line. This is no problem, presently, with the 12- and 13.2-kv circuits, and in many cases hot-line work is made easier because of the additional clearances employed in construction practices.
- 2. Increased outages due to greater circuit exposure. Proper sectionalizing of primary circuits can minimize this problem.
- 3. Lack of equipment for systems above the 15-kv class. The manufacturers have made equipment available for multi-grounded neutral systems through 20/34.5 kv.

Table I  
Distance And Area Coverage Advantages Of Increased Distribution System Voltages

| Circuit Voltage -Kv | Distance (Constant Kva) |                       | Area Coverage* |
|---------------------|-------------------------|-----------------------|----------------|
|                     | Voltage Drop Ratio      | Current Amperes Ratio | Area and Load  |
| 12.5 vs 4           | 9.7 to 1                | 3.1 to 1              | 4.55           |
| 23 vs 4             | 33 to 1                 | 5.75 to 1             | 10.2           |
| 23 vs 12.5          | 3.7 to 1                | 1.9 to 1              | 2.25           |
| 34.5 vs 12.5        | 7.6 to 1                | 2.76 to 1             | 3.5            |
| 46 vs 12.5          | 13.5 to 1               | 3.7 to 1              | 5.6            |
| 69 vs 12.5          | 30 to 1                 | 5.5 to 1              | 9.7            |

feeder length and width varying in same proportions to original circuit. Both area and load are increased by tabulated value for same percent voltage drop.

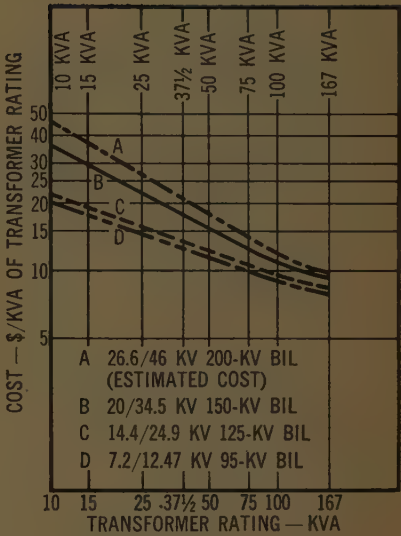


Chart I—Influence of insulation requirements on distribution transformer costs.

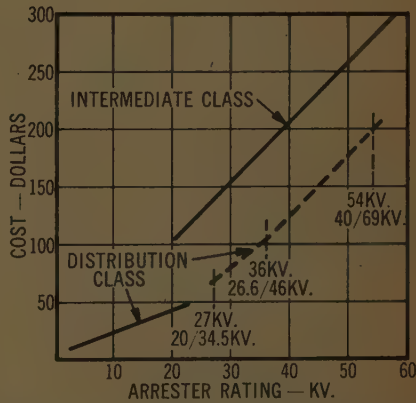


Chart II—Cost comparison for distribution-class arresters and intermediate arresters, showing low reduced BIL of distribution system reflects considerable savings.

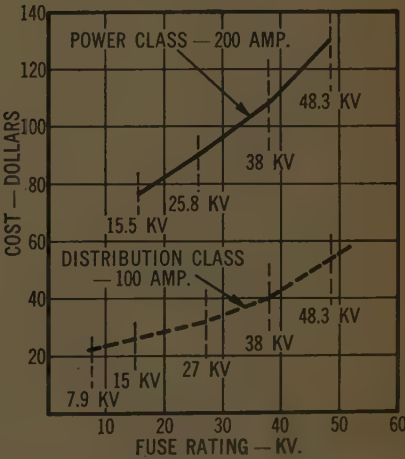


Chart III—Fuse cutout cost comparison for distribution-class 100-amp. units. Again, reduced BIL of system reflects considerable savings.

# CARRIER CONTROL OF REMOTE SWITCHED CAPACITORS MAINTAINS STATION REACTIVE LEVELS

*Experience suggests that optimum arrangement would be automatic remote control of distribution switched banks using a reactive system to maintain preselected station reactive levels, with manual over-ride for unusual requirements.*

By HOWARD C. TYRRELL,  
Assistant Engineer  
and ROBERT V. BOWSER,  
Engineer, New England Electric System

Application and use of capacitors on the New England Electric System over the years have probably paralleled those on other systems with, first, installation of a limited number of fixed capacitors, followed by experimental installations of switched capacitors at strategic points, and then application

of large banks of capacitors to station buses where switching could be more positively controlled. Recently, however, the system has conducted successful experimentation with remote carrier-controlled switching and monitoring of capacitor banks located on distribution feeders near loads.

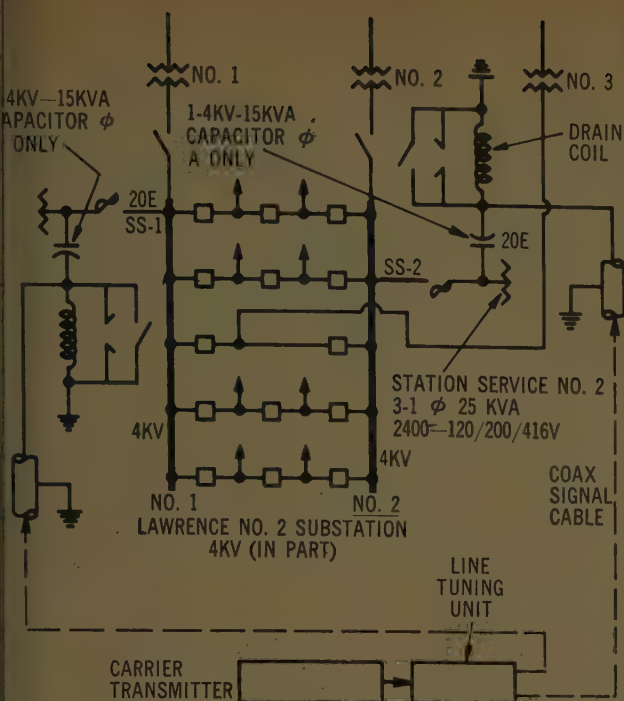
Typical capacitor bank installation on feeder showing oil switches and outdoor meter socket on capacitor rack.



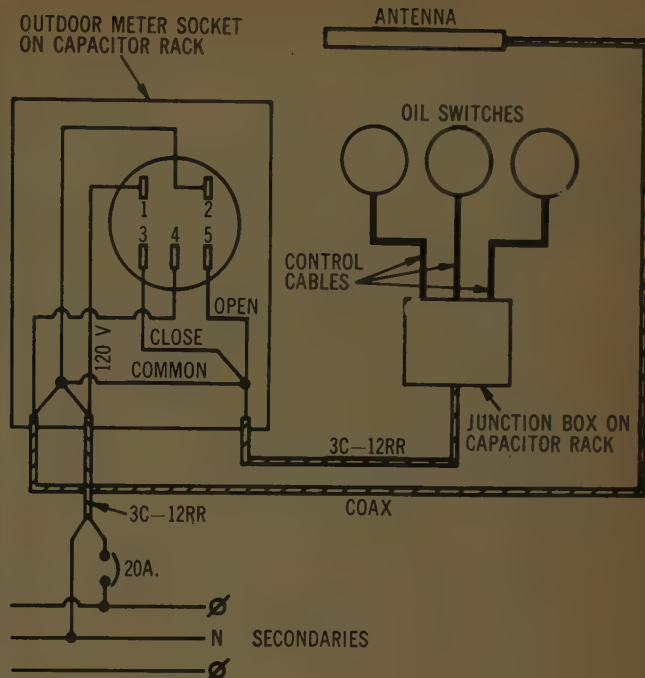
## Capacitor Applications

Early in the history of the system, power requirements were supplied by relatively small generating stations located in the several cities in the area. As time went on, and these smaller generating stations became overburdened, larger generating stations were erected and transmission lines built to these various cities to meet the increasing need for electric power.

Voltage regulation on the local substation buses, important because of the many unregulated distribution feeders, was controlled by the manipulation of local generation as necessary. But, as loads continued to grow, transmission and distribution losses became appreciable, and local generating stations were no longer able to adequately regulate



One line diagram of feeder capacitor remote control equipment arrangement at Lawrence No. 2 substation.



Wiring diagram of control arrangement at capacitor location.

voltage on the substation buses. It was at this point that a program was started to install capacitors to reduce losses and improve voltage regulation on distribution and transmission lines within the system. The first step was to install fixed capacitors on the distribution feeders up to the limit imposed by light load voltage. Then a group of switched capacitors were installed, controlled by voltage on the unregulated distribution feeders. Soon after this, a second group of switched capacitors were installed, controlled by current on the regulated distribution feeders. However, with a rapidly increasing day load on some feeders, and with evening load only on others, it became increasingly difficult to provide adequate voltage control by this method. In addition, difficulties were encountered in locating capacitor banks on the distribution system where sufficient primary feeder current was available to actuate the control devices. Also, with the increasing number of switched units, together with the high rate of equipment failure, switches, controls, etc., it became difficult to be certain that these

units would be in service when needed. Necessary additions to the system's capacitive supply were, therefore, made in the form of large banks of capacitors connected to the substation buses and under the control of the substation operators. These, of course, were less efficient from a loss savings standpoint.

Thus, it can be seen, we had a need for some type of control that would allow us to:

1. Install capacitors on our distribution feeders as close to the load as possible.
2. Switch these capacitors on and off as necessary to provide adequate voltage regulation at all times.
3. Monitor the individual units to be certain that they are functional when needed.

Late in 1958 an AIEE Transactions Paper No. 58-868<sup>1</sup> described a capacitor control system in use on the Baltimore Gas and Electric Company System. This system utilized a conventional power line carrier transmitter to control transistorized receivers located adja-

cent to switched capacitor banks. We felt that such a system would enable us to gain needed flexibility for placing the control of pole mounted capacitor banks in the hands of a station operator.

A trial installation was agreed upon subject to satisfactory propagation tests. The purpose of such tests was to be three-fold:

1. To determine the adequacy of the coverage of a carrier transmitter signal over a typical 4-kv distribution area.
2. To determine the extent of signal coupling with adjacent systems. Coupling between systems was recognized to exist principally at those locations where open wire circuits from different sources were in proximity to each other and through substation transformers connecting L.T. and H.T. systems together.
3. To select a suitable clear channel frequency as necessary to avoid interference with either other system-operated carrier devices or with other utilities.

#### Begin Test Program

A suitable test carrier transmitter, together with signal strength

1. Gordy, E. M., and others, "Benefits of Line Capacitors Extended by Remote Automatic Control," AIEE Transactions Paper 58-868, June, 1958.

measuring devices, were obtained on a loan basis from the equipment supplier as well as the assistance of engineering personnel familiar with this equipment. A typical 4-kv distribution system was selected which contained representative feeders of all types, that is, overhead open wire circuits, underground cable circuits, and combinations of overhead and underground circuits. All feeders for the area selected, common to the rest of our system, are three-phase, four-wire 2400/4160 volt grounded-neutral circuits, well saturated with fixed and switched shunt capacitor units and all supplied by individual induction regulators.

The tests made indicated that adequate signal strength to insure reliable operation of receivers was available throughout the test area. It was originally hoped that sufficient coupling existed naturally between the overhead feeds supplied from the 4-kv bus under test and the other closely associated overhead feeders supplied from different 4-kv sources to permit control of receivers over an area beyond that under test. In general, although the signal did couple to these adjacent areas, the signal strength was not sufficient to guarantee reliable receiver operation. Test frequencies of 70kc, 102kc, and 149kc showed the best signal to noise ratio to be at the lowest frequency. No interference with other facilities was evident during these tests. The authors wish to acknowledge the assistance given them at this stage of development by Messrs. E. M. Gordy, W. L. Ridenhour, and C. Wasserman of the Baltimore Gas and Electric Company.

Features of the trial installation made as a result of the satisfactory propagation tests and the equipment used are as follows:

#### Location

A 4-kv distribution area was selected which was served from a normally attended substation to the end that the operator could control an additional block of capacitors as

required for either local or system needs. In addition, a number of existing switched capacitor banks were well located for ready conversion to carrier control.

#### Transmitter and Receivers

A single 10-watt FM carrier transmitter was coupled to one phase only of the 4-kv bus using a standard power factor correcting unit together with a drain coil and protective gap. This transmitter sends out a continuous 70kc carrier which radiates throughout the 4-kv system supplied by this substation.

Audio tone modulation of this 70kc carrier is picked up by all receivers on the system. These receivers are equipped with frequency sensitive relays in their output circuit responsive to only two of the modulating tones: one for the (on) and one for the (off) function. Individual (on) and (off) control of all receiver locations is thereby accomplished up to a maximum of 20 units or groups of units.

The receiver package contains the 70kc carrier receiver, power supply auxiliary control relay, thermostatically controlled heater, and auxiliaries—all mounted in a standard socket type watt-hour meter case. The basic receiver is an eight-transistor TRF FM receiver which is coupled to the 4-kv lines by a small ferrite core inductive coupler located close to the lines. No direct coupling is necessary.

#### Control

Control of the audio tone modulation of the carrier transmitter is accomplished by a unit which permits either manual selection and transmission of tones as desired by an operator or an automatic programming of a tone sequence in response to a system sensing device such as a voltmeter. The manual control method has been the basic type used to date for the present installation.

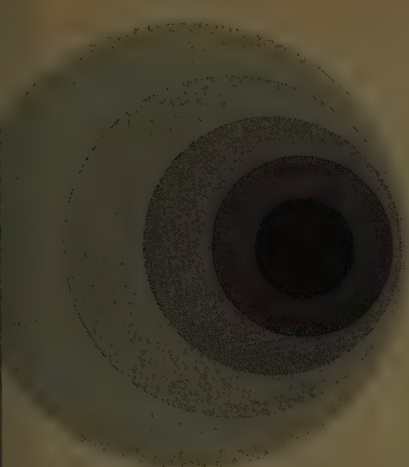
Monitoring of the system's operation is accomplished by use of a recording varmeter. Use was made of a system surplus Leeds & Northrup micromax recorder. This in-

strument was set up to record total substation vars and scaled so that the operation of a typical 300-kva capacitor bank could be readily identified on its standard 10-in. chart. Check therefore can be made of total station power factor as well as operation of the remote control banks. A bonus offered by this arrangement is the ability to maintain a constant check of the operation of switched capacitor banks not previously possible without field inspection, therefore eliminating any need for an operation counter.

#### Summary

Nine capacitor bank locations containing a mixture of 300 and 450-kva units totaling 3300 kva have been operating successfully since December, 1959. While this is not a significant amount of reactive kva as regard to system voltage control, it illustrates the potential of such a mode of control if expanded to cover a larger number of units. It appears likely that an optimum arrangement for our conditions might result from the automatic remote control of distribution switched units using a reactive system to maintain a preselected total station reactive level within a relatively narrow band width, together with manual control over-ride by our operator for unusual system requirements.

Little has been mentioned relative to cost. It appears that line equipment costs for carrier control equipment is essentially a standstill when compared with other acceptable types of control with the exception of time switch. Cost penalty for the installation of a remote control carrier system seems to be confined to the cost for equipment installation at the substation. Estimates for such an installation will range around \$5000 upward, depending upon the degree of refinement and instrumentation desired. These costs seem reasonable, especially when it is considered that this system will accomplish a function not obtainable by other means.



## HOW MUCH CAN A GUY ANCHOR HOLD?

*Anchoring of electric-utility poles and structures is becoming increasingly an exact science as more and more is being learned about how anchors develop their holding power.*

By W. L. HOLLANDER, Senior Project Engineer, Anchors,  
and RAY MARTIN, Chief Engineer, Line Construction Materials, A. B. Chance Company

**HOLDING POWER** and creep of a guy anchor buried in soil can be explained fairly accurately by principles that might be called "earth dynamics". A well-tamped anchor can creep only as the soil straining its motion flows under enormous pressure out and around the edges of the anchor to fill in the void below the anchor caused by its motion. In other words, movement of anchors in soil under tension can be compared with movement of objects in an extremely viscous fluid. Applicability of this principle has been indicated many times in field tests when anchors installed with voids on their undersides have crept under much lower tensions than have anchors installed under identical conditions but with no voids. While it has been impossible to apply quantitative measurements from the field of dynamics to anchors as yet, these concepts can be most helpful in visualizing anchor characteristics.

### Weight-Of-Cone Principle Now Outmoded

One of the first principles in calculation of anchor holding power to be questioned through use of the earth-dynamics concept was the theory that pull-out tension depended upon weight of an inverted cone of earth with the anchor as vertex and surface of the ground as base. The inverted-cone-of-earth theory predicates that anchor holding power will increase with in-

crease in setting depth. However, in practice, an increase in depth may result in an increase; in no change; or in an actual decrease of holding power.

Viscosity of the soil should be the major factor in determining holding power and creep of an anchor if the new philosophy were correct. Fortunately for the new theory (and for the practice of anchoring as well) this has proved to be the case. A whole new method of evaluating holding power and creep of anchors has been evolved, based upon viscosity of soils in which they are buried.

Soils have been classified, as

shown in Table I, into eight types depending upon their viscosity, and holding power of anchors determined for each class of soil. Thus, an anchor that might develop 25,000 pounds of holding power in class-3 soil or hardpan could hold perhaps 10,000 pounds in dry, class-7 sand. Fig. 1 shows how rated holding power of typical anchors varies in soils of different classes.

Correlation of anchor holding power according to soil viscosity classification has been proven by many tests where anchors have actually been loaded and creep has been measured. It has been found that as long as two feet of a particu-

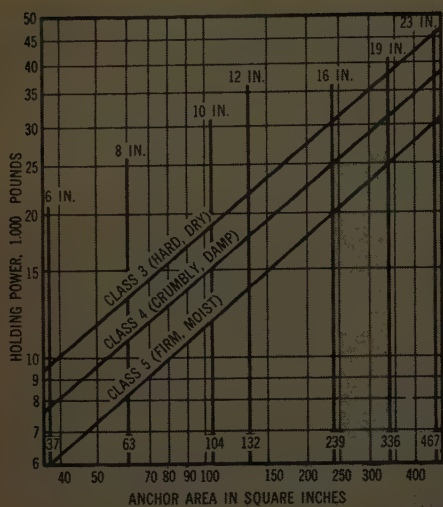
TABLE I—SOIL CLASSIFICATION DATA

| CLASS | DESCRIPTION OF SOIL                                                  | PROBE VALUE        |
|-------|----------------------------------------------------------------------|--------------------|
| 1     | Solid Bed Rock                                                       | — —                |
| 2     | Laminated Rock; Slate; Schist; Sandstone                             | — —                |
| 3     | Shale; Broken Bed Rock; Hardpan; Compact, Clay-Gravel Mixtures       | Over 500 in.-lbs.  |
| 4     | Gravel, Compact Gravel and Sand; Claypan                             | 400-500 in.-lbs.   |
| 5     | Medium-Firm Clay; Loose Sand and Gravel; Compact Coarse Sand         | 300-400 in.-lbs.   |
| 6*    | Soft-Plastic Clay; Loose Coarse Sand; Clayey Silt; Compact Fine Sand | 200-300 in.-lbs.   |
| 7     | Fill; Loose Fine Sand; Wet Clays; Silt                               | 100-200 in.-lbs.   |
| 8**   | Swamp; Marsh; Saturated Silt; Humus                                  | Under 100 in.-lbs. |

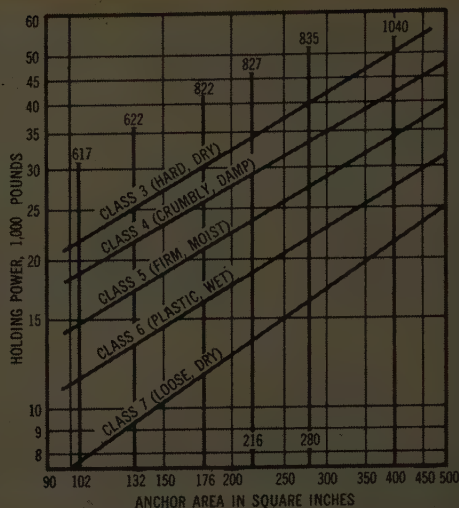
\*Includes areas only seasonally wet with slow drain as in fairly flat terrain.

\*\*Install anchors deep enough, by the use of extensions, to penetrate a Class 5, 6, or 7 underlying the Class 8 Soil.

## CONE ANCHOR



## NEVER CREEP ANCHOR



## SCREW ANCHOR—(Machine Installed)

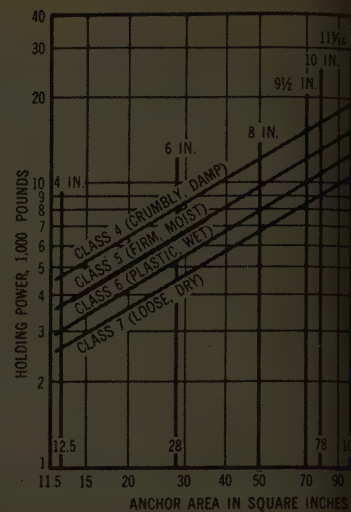


Fig. 1—Holding power of an anchor depends both upon its size and viscosity of soil in which it is installed. Here, allowable loadings on various sizes of four common types of anchors are plotted against classes of soil graded according to viscosity. Rated loading in each case is that sustained with total creepage less than four to six inches.



This Chance earth probe measures torque required to twist it into the earth. Direct correlation between torque as determined by this probe and soil classification gives an accurate measure of anchor holding power at strata found at different depths below surface of the ground.

This Chance Portable hydraulic anchor-test machine has been used in checking holding power of hundreds of anchors. Holding power and creep are measured simultaneously.



lar class of soil lie over the anchor when it is installed, holding power of the anchor remains within rating for that class of soil. This is so even if strata of other soil classifications are above or below the stratum where the anchor is located. In all cases, the anchor should be set deep enough to avoid variations due to seasonal change.

This emphasizes importance of knowing general soil conditions when a group of anchors is to be installed or of determining soil classes at various depths at specific locations where particularly important anchorages are to be made.

Thus, there might be an overlay of four or five feet of damp, marshy soil of class 7 or 8 over a much firmer soil of class 5 or 6. Installing the anchor just two or three feet beyond the more fluid soil into firmer soil could, in some cases, double its holding power. On the other hand, an extra few feet of anchor depth might take it well into a softer stratum and thus reduce its holding power.

Core drilling or a new earth probe recently made available can give accurate readings of soil characteristics and holding power. The earth probe measures torque required to twist an earth bit into the ground. Correlation between torque required and class of soil has been established with considerable accuracy so that holding powers of anchors at depths tested are assured.

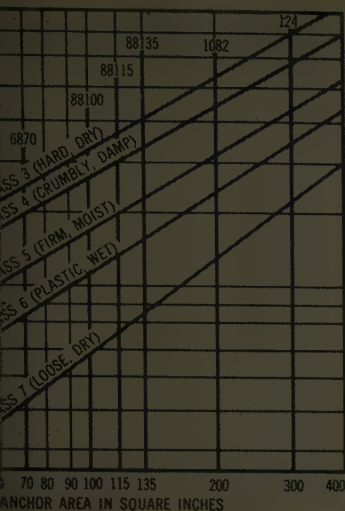
The earth-dynamics theory also points out necessity for well-tamped backfill. Even the most dense soils degrade several classes if backfilled carelessly. Soil measurements have little meaning if a column of soft soil extends from anchor to surface of the ground.

### Creep And Pullout Forces

Another old idea, now abandoned was that force required to pull an anchor completely out of the ground was a measure of anchor merit. It is true that a well-designed, large anchor properly installed will require more force to pull it out of the ground than will a small or improperly installed anchor. However, the damage is done by a shifting anchor long before it emerges from the ground.

Merit of an anchorage is provided in the first four to six inches of creep. Beyond this point structure pull out of line and conductor span sag to a point where the anchor can be considered to have failed even though it may still be far below the surface of the ground.

Field tests have established creep vs-time characteristics of properly installed anchors, as shown in Fig. 2. It has been found that once anchors have been stressed at some 2000 pounds to compact the earth and to set or bed the anchor, additional creep under load diminishes rapidly with time until a plateau is



established for any given loading within the rating of the anchor. Creep beyond this point is negligible.

If loading is now increased considerably but within rating of soil and anchor, a small amount of additional creep will occur but equilibrium will again be established at a new plateau well within limits of tolerable creep.

Measurement of effective creep of an anchor at rated maximum working load thus provides a far more realistic evaluation of anchor merit than does determination of pull-out strength.

## Ultimate Strength of Anchors

A curious fact in connection with ultimate physical strength of anchors has become evident as test data has accumulated. It now becomes apparent that viscosity of the soil has the opposite effect on ultimate strength of anchor structures than the effect it has on their holding power. The more viscous the soil, the higher becomes ultimate strength of an anchor itself before physical damage is received. Formerly, before soil viscosity was considered, an anchor that received physical damage at low total load was automatically considered defective.

The old idea was that unit loading on an anchor would be uniform over its entire surface. Under this theory, structural failure should al-

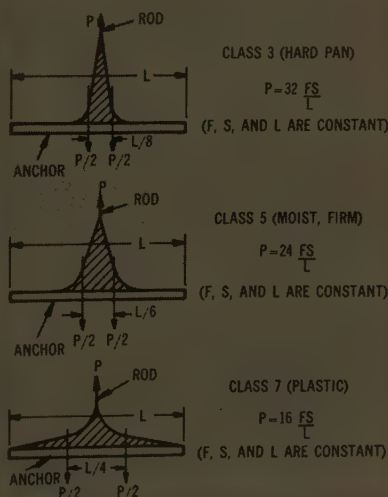
ways occur at the same load since bending moment equals section modulus times extreme fiber stress.

But, under the earth dynamics theory, unit loading over the surface of the anchor should vary because of earth flow. While it is impossible to observe soil motion in the ground during a pull test, there must be a flow of earth over edges of the anchor from the loaded side to the back, or unloaded, side of the anchor. Effect of this flow is to shift centroid of the earth resisting forces away from point of application of load at the rod toward outside edges of the anchor.

It has been proven that the rod will fail before damage occurs to the anchor in most pull tests on anchors in hard pan. This is because bending moment on the anchor in hard pan for a given load on the rod is low since hard pan is highly viscous and reactions by the earth are centered close to the rod as shown in Fig. 3(a).

But as soil becomes less viscous, as in plastic clays, reaction points in the resisting earth shift outward, increasing effective moment arms, and the load which produces maximum or destructive bending moment is reduced. This is shown graphically in Figs. 3(b) and 3(c).

Fig. 3—Ultimate strength of an anchor itself is reached at lower loadings in soft soil than in hardpan. Illustration shows how effective lever arms of earth-reaction forces are short in hardpan, keeping bending moment and maximum fiber stress to a minimum. Soft soil flows along the surface of anchor increasing length of lever arms to centers of gravity of earth-reaction forces which, in turn, increase bending moment and fiber stress.



Anchors are designed to be amply adequate for actual working conditions. Thus, limitations due to structural strength of anchors are of academic interest only since, for a given type of soil, loads would be limited by maximum allowable creep which would occur far before ultimate strength of the anchor itself was reached. Ultimate structural strength in an anchor becomes a factor only in pull-out tests.

## Improved Co-ordination

Characteristics of a mechanical system as a whole including sags, tensions, and deflections can be controlled more precisely for given load conditions now that performance of anchors in various kinds of soils can be predicted accurately. Modern anchorage techniques and equipment that can be matched with a high degree of accuracy to mechanical design considerations of overhead structures result not only in more co-ordinated systems but also in lower over-all costs since over-design to compensate for unknown factors is reduced.

Such precise design also contributes to lower maintenance costs over the lifetime of the system.

Fig. 2—These tests show that creep of an anchor occurs in first few minutes of loading after which anchor establishes equilibrium as soil compacts. Tests were made on a 143-sq.-in., power-installed screw anchor installed in class-6 soil at 45 degrees. Rated ultimate holding strength of this anchor in class-6 soil is 17,000 lb.

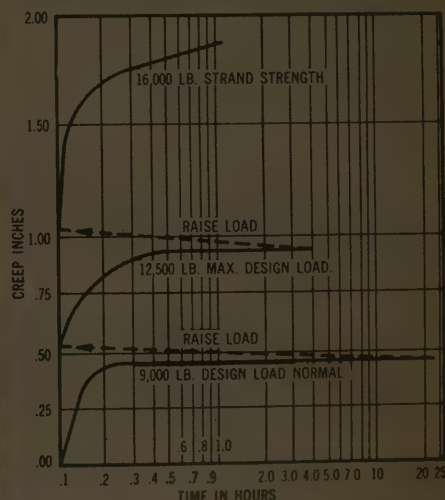




Fig. 1—Both high and low voltage ends of the mobile substation are metal enclosed and have no live parts exposed.

# VERSATILE MOBILE SUBSTATION FULFILLS THREE SERVICE NEEDS

*Completely metal-enclosed unit provides high degree of safety; numerous system connection points, color coded, and special cable carts bifilarly wound expedite cutting in unit.*

By H. J. LAMON, Superintendent,  
Municipal Power Plant, Austin, Minnesota  
and THOR G. BANK, Engineer,  
Joseph V. Edeskuty & Associates, Minneapolis

**A** RATHER UNIQUE and versatile mobile substation, designed to serve several important uses, was recently delivered to the municipal power plant at Austin, Minnesota.

Essentially, the unit is a single-circuit substation that can serve as a complete substation for reserve capacity, as an emergency unit in place of existing unit substations

and, as it has already been used during additions and revisions to the 13.8-kv and 2.4-kv systems.

## Specifications

The substation (Fig. 1) is a three-phase unit, rated 2000 kva when forced-air cooled and 1300 kva when fans are not operating. The high-voltage side is 13.8-kv delta with no-load taps at 13,800, 13,455, 13,110, 12,765, and 12,420 volts. The low-voltage side is 2400-volts delta with automatic tap changing under load to give 16⅔-percent voltage taps above and below the 2400-volt level.

## Unit Totally Enclosed

The high-voltage incoming line section, consisting of terminals, load-break disconnect switch, fuses and lightning arresters, is fully enclosed in a reinforced sheet-metal compartment having access door at the front end of the trailer. The low-voltage, or outgoing, section consisting of oil circuit breaker, instrument transformers, control power transformer, lightning arresters, and a hinged panel containing



Fig. 2—Opening access doors at rear of trailer reveals low-voltage circuit breaker instrument transformers, and hinged panel containing instruments and relays.

g necessary instruments and re-  
ys is also fully enclosed in a  
inforced steel compartment hav-  
g access doors at the rear of the  
ailer. (See Fig. 2.) Thus, there are  
“live” parts exposed and the unit  
n be parked in a public area with  
imum danger to passersby.

### Adaptation to System

The decision to purchase the mo-  
le unit led to plans for revision  
nd expansion of the system to pro-  
de convenient connection points  
both high and low-voltage cir-  
uits at major permanent substation  
tes. This involved installing at  
ch permanent station a 13.8-kv  
he tap through a disconnect switch  
the mobile unit and a 2.4-kv tap  
rough a dummy breaker to the  
obile unit. The single-line diagram  
the electrical arrangement is  
own in Fig. 3.

Hot line clamps have also been  
rovided at important overhead  
oints where the mobile unit may  
e connected.

### To Expedite Connections

As a means of reducing time re-

Fig. 3—Single line diagram shows how mobile unit can be connected to system in emergency to replace unit substation; taps are installed at existing substations and at strategic overhead points to expedite connecting mobile unit.

Fig. 4—Cable carts transport cable to service site; cable is wound bifilarly on sectionalized drums so that both ends are available without unwinding the entire length.



quired to put the mobile unit in  
service with the proper phase re-  
lationship, planned taps to the mobile  
unit, as well as cables, are color  
coded. Some of the overhead con-  
nection points are also color coded  
to help keep phasing straight. As a  
precautionary measure, however,  
connections are checked for correct  
phase relationship before a circuit  
is completed.

At the mobile unit, cables enter  
through an opening equipped with  
an insulating barrier which clamps  
and supports the cables. Roof en-  
trance bushings can be added in  
the future if desired.

### Cable Carts

Portable cables for use with the  
mobile unit are mounted on espe-  
cially-designed and constructed  
cable carts, one for the 13.8-kv cable  
and another for the 2.4-kv cable.  
Each cart, basically, consists of a  
sectionalized drum mounted on a  
two-wheel trailer that can be moved  
about by means of a pick-up truck.  
(See Fig. 4.)

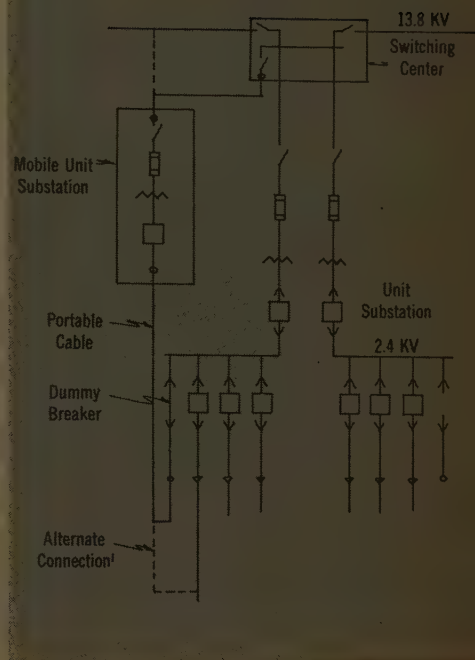
Each cable length is 150 ft long  
and has extra-flexible stranding,

rubber covered and shielded for  
safety. One end of each cable is  
equipped with a rain shield. Cable  
is wound bifilarly on each drum so  
that both ends are available with-  
out unwinding the entire length of  
cable. Cable drums may be rotated  
either manually or by portable elec-  
tric motor operating through a re-  
duction gear unit for convenient  
handling in the field.

### Accessories

The substation trailer is equipped  
with electric brakes controlled from  
the cab of the tractor. It is also  
provided with running and parking  
lights, as well as convenience out-  
lets, all of which can be energized  
by the substation itself or from a  
service drop on a convenient utility  
pole. Other accessories include step-  
ladder, wheel blocks, and safety  
break-away.

The Austin utility anticipates  
many useful years of service from  
this equipment which will permit  
normal maintenance of permanent  
substations without service inter-  
ruptions, and reserve substation  
capacity when needed.





## LBE Women's Conferees Hear This Advice:

### It's True about Marketing KWH, Too— Best Way Is "Sell the Sizzle, Not the Steak"

The role played by women in the industry through Home Service and the Medallion Homes was appraised in every presentation for the 5th Annual Live Better Electrically Women's Conference in Chicago by two underlying questions: Can women in the electric utility industry take up the challenge of a new era of opportunity? And: Can they cultivate, demonstrate and educate the buying public to recognize the advantages of All Electric Living?

John H. K. Shannahan, Asst. Vice-Pres., American Elect. Pwr. Service Corp., was optimistic on both scores, but he pointed out that "Customer interest is lowest in *electricity*, but reaches its highest point when he (or she) considers the end benefit.—If electricity can do it, fine.

"We must be prepared to supply service in an ever-widening area," he said. "We have a tougher job ahead, and we are feeling increasing pressure from the gas industry. There was more gas heating advertising in the last year than in the last several years. And oil will increase its competition. Our competitors are concerned with our competition. *But*, the increased competition will attract *more* advertising, which in the end will attract *more* business," Mr. Shannahan advised.

Ralph M. Zeuthen, Mgr. of the LBE Program at EEI, defined the prime selling points for the advantages of All Electric Living ("pleasant", "easier", "more comfortable", "cleaner") through its key advertising word "flameless". According to Mr. Zeuthen, the motivation study undertaken last year showed "total movement strongly toward more 'electrical living'; some consumer groups (gas users) moving less rapidly, (but) gas range owners have only slightly fewer electrical appliances than those who cook with electricity." Study also showed, he said, that gas is regarded as "less costly substitute for 'modern electrical living'."

While Mr. Zeuthen said that "modern living" means "new appliances" to 60-percent of the housewives questioned, R. L. Albaugh, System Supervisor, Ind. & Mich. Elect. Co., pointed out that many of our sales today are replacing existing electric equipment and therefore do not add to the kwh increase per customer. "This is in no way intended to lessen the importance all of us should place on replacing existing electric equipment," he said. "However, our rather high saturation of appliances and kwh use make it increasingly difficult to maintain historic kwh growth rates. In our case, this means new markets such as electric home heating."

He continued: "We have the problem of rapidly increasing costs and, at the same time, a tendency toward a slow-down in the residential growth pattern. Management is making every effort to make technical advances and reduce expenditures in every possible area. There are always times when rate increases are necessary; however, I believe our management and most utility leaders feel that this is un-

desirable particularly in the face of the ever-present threat of socialism. The most important area for improving profits is increased sales. Are we organized to sell the markets?

"Our sales organizations are asking themselves: 'What should we promote?' We have the most obvious answer: THE MEDALLION HOME."

C. E. Anderson, mgr., sales promotion, Va. Elect. & Pwr. Co., told his women audience that they "have the power to make people want electric heat. You (women) are the specialists who must make them recognize the advantages.

"Let's increase our pace, because the residential load beckons us on a great new business. Let's face it, a greater portion of the total revenue of most utilities comes from home uses of electricity.

"You don't need to be reminded that desire is the forerunner of demand. Folks have to want before they ask how much. And that's where women come in—They can make other women want electric house heating—make them want 'Live Better Electrically'.

"Never underestimate the power of a woman—on other women!" said Mr. Anderson.



Dry-cleaning in self-service stores—this is one of the newest sources of electrical load (a little more than 20-amps at 230-v) on the horizon. Soon to become available to patrons of such self-service laundries is this Westinghouse coin-operated drycleaner. Charges are expected to be about \$1.50 for an eight-pound load, compared to about \$6 to \$7 for a similar load at regular cleaners.



Conference visitors to General Atomic's John Jay Hopkins Laboratory showing interest in the HTGR fuel elements are (l to r): Irving L. Wade of the Commonwealth Edison Co., M. S. Luthringer of the Central Illinois P. S. Co., L. E. Karrer of the Puget Sound P. & L. Co., E. R. Tully of General Electric, T. W. Delzell of Portland General Electric Co., and C. E. Cannon of Wash. Water Power Co.

## AEC-General Atomic's Meeting Briefs Industry—

# Report "Progress in All Areas" With HTGR Power Reactor Project

*"Progress in all areas."*

So runs the latest official communiqué regarding the development of the world's first high temperature gas-cooled graphite-moderated reactor.

Comprehensive reports on this research and development project under way at General Atomic Division of General Dynamics Corporation at San Diego were presented at a two-day HTGR Civilian Power Reactor Conference in that Southern California city on January 17-18. Sponsored by the U. S. Atomic Energy Commission and with General Atomic as host, the meeting was one of a series to inform industry, research groups and other organizations of progress in various nuclear power projects being carried out under AEC's civilian reactor development program. In attendance were more than 350 delegates from all parts of the United States, representing electric utilities, electrical manufacturers, chemical companies, AEC institutions, laboratories and such. The reactor to which the two days of discussion were devoted is for the new 40,000-kilowatts nuclear generating station at Peach Bottom, Pennsylvania, on the system of Philadelphia Electric Company. The

plant will be owned and operated by Philadelphia Electric, but, because the reactor is a prototype, 52 other utility companies, organized as the High Temperature Reactor Development Associates, Inc., are paying the cost of the developmental construction under a \$24,500,000 fixed-price contract. AEC is contributing a maximum of \$14,500,000 toward General Atomic's research and development and will waive up to \$2,500,000 in fuel charges.

Bechtel Corporation is the engineer-constructor and prime contractor for the station and Westinghouse Electric Corporation will supply the conventional generating equipment.

Peach Bottom HTGR will be the first nuclear plant with an all-graphite core. It will utilize fuel-moderator elements containing enriched uranium and thorium carbide fuel in a graphite matrix. Combining the fuel and moderator is expected to reduce the size of the reactor in relation to its power output.

Details of General Atomic's progress on HTGR research and development were presented to the conference by Dr. Robert B. Duffield, manager of the project. Other

speakers were Russell H. Ball, assistant manager of technical operations for AEC's San Francisco Operations Office; Robert E. Ginna, chairman of the board of directors of Rochester Gas and Electric Corporation and president of High Temperature Reactor Development Associates, Inc.; Lewis R. Gaty, vice president for engineering and research, Philadelphia Electric Company; W. Kenneth Davis, vice president of scientific and nuclear development, Bechtel Corporation; Frederic de Hoffmann, senior vice president of General Dynamics Corporation and president of General Atomic Division; Dr. Edward C. Creutz, General Atomic vice president of research and development; S. R. Sapirie, manager of operations at AEC's Oak Ridge National Laboratory.

Dr. Duffield described accomplishments in the seven major areas of the project.

He announced "very significant progress" in the development of the graphite-clad fuel elements and stated:

"The performance of graphite matrix fuel compacts in irradiation tests to date has exceeded expectations.

"A prototype fuel element is about to begin extended irradiation testing in a gas-circulated loop in a test reactor.

"Large samples of low permeability graphite tubing have been produced in the course of the General Atomic development program and others have been procured from outside suppliers."

The reports on the other six areas follow:

**FSSION PRODUCT CONTROL**—In addition to work on low permeability graphite, fission product control systems and equipment now being tested include internal traps, external traps and delay beds.

**NUCLEAR DESIGN**—A low-power critical assembly to provide information on the physics characteristics of the reactor has been in operation since July, 1960. This experimental work supplements extensive mathematical computational work and analyses related to the anticipated core design and performance.

**THERMAL DESIGN**—Various heat transfer experiments and other calculational work are in progress.



Dr. James Brown (in shirt sleeves), General Atomic's physicist-in-charge of the HTGR facility in San Diego, explains fuel compacts to conference delegates.

**HELIUM HANDLING AND PURIFICATION**—Effects of helium impurities on system performance are being studied, as well as methods to control such impurities.

**DEVELOPMENT OF INSTRUMENTATION AND OVER-ALL PLANT CONTROL**—Work now in progress includes simulation by analog computers; development of thermocouple materials; development of specific instrumentation.

**COMPONENT DEVELOPMENT**—Key system components are in the detailed design phase. Control rod drive testing is in progress. A half-scale coolant flow test model is being operated.

In opening the conference Dr. de Hoffmann declared that the relations of General Atomic and AEC in "this forward looking program" are marked by lots of vigor and lots of enthusiasm. He added that "the project can go ahead very quickly if everyone goes ahead."

Robert E. Ginna stressed the need for high temperature high performance reactors in order to take full advantage of the advances in generating equipment. And he warned that electric utilities have a responsibility to provide facilities to do everything possible for their customers.

As evidence of confidence in high temperature reactors, Mr. Ginna mentioned the plan of seven investor-owned electric utility companies in New York State for an \$8,700,000 development program

through the next three years directed toward ultimate construction of a large-size atomic power plant capable of producing economic electricity. The final objective of the program is a nuclear plant of 300,000 to 500,000 kilowatts—larger than any yet undertaken in the United States—to be placed in operation in New York State.

The seven utilities—comprising the Empire State Atomic Development Associates, Inc.—have selected General Dynamics Corporation to carry on the development. Under the contract, which became effective January 1 of this year, the ESADA companies are funding \$4,500,000 of the cost and General Dynamics \$4,200,000.

Lewis R. Gaty told the conference that Philadelphia is eager to proceed with construction of the non-nuclear sections of the Peach Bottom plant as soon as possible and to follow with work on the nuclear portions as soon as the reactor construction permit is obtained.

W. Kenneth Davis described and illustrated with colored slides the engineering activities of Bechtel Corporation for the Peach Bottom project.

S. R. Sapirie declared that the scientists and engineers at Oak Ridge Laboratory are enthusiastic about the HTGR project. Apropos of the numerous types of reactors, usually designated by their initials, he said: "What we want now is an LCPR—a low cost power reactor."

Dr. Edward C. Creutz reviewed nuclear research and development.



Intermission chat brings together Rochester Gas & Elect. Co.'s Pres. Robert E. Ginna and S. R. Sapirie, manager of AEC's Oak Ridge Operations Office. Mr. Ginna is also president of High Temperature Development Associates, Inc.

## Safety Council Hears About EEI Activities

Progress on many projects aimed at increasing safety in utility operations were reported to a recent meeting of the National Safety Council's Public Utilities Section. Describing current activities of EEI member companies, S. H. Young of the Hartford Electric Light spoke briefly of these recent accomplishments:

1. Development of a comprehensive guide for the safe operation of aerial basket equipment.
2. Development of 12 packages of material on the STOP-SHOOT theme for distribution throughout 1961.

3. Success in persuading advertisers to refrain from showing unsafe equipment, conditions and methods in their advertising.

Mr. Young noted that one EEI subcommittee is working with the Council in preparing warning stickers and material that can be purchased from NSC for distribution to contractors and operators of equipment which may accidentally come in contact with overhead utility lines.

Mr. Young listed these projects as coming along:

1. A protective equipment subcommittee is working with other groups in the development of a standard for the comparatively new low-voltage rubber glove.
2. A compilation of practices being made to cover the proper placement of protective working grounds.
3. A uniform safe work practice manual is being developed.
4. A guide on climbing equipment has been revised.
5. The manual covering electric contact hazards is being revised to contain new ideas to guard against warn workmen.
6. A visual aids subcommittee working on a slide-film dealing with the effect of electric shock on the human body.

The EEI spokesman also pointed out that another special committee is studying the effects of radiation exposure on personnel to be employed in electric utility operations at atomic power plants.



## MANUFACTURERS-PRODUCTS

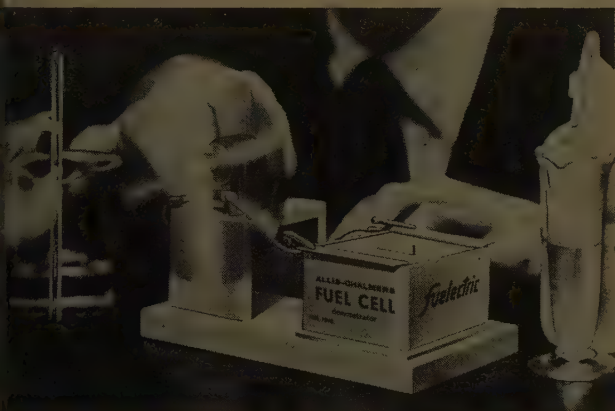
### Working Model Fuel Cell Available From A-C

An instructional and educational working model fuel cell has been developed by Allis-Chalmers and is available for immediate delivery to supplement the limited text materials available in science books.

Consisting of two parts, a small electric motor and the fuel cell itself, the model measures 3½-in. wide by 5½-in. long. Included with the model is a wall chart which presents a schematic diagram of the system and traces the complete reaction involved in changing chemical energy to electrical current.

Ordinary easily-obtainable chemical ingredients, an electrolyte of potassium or sodium hydroxide, an alcohol fuel, and hydrogen peroxide as the oxidant, are readily available in high school chemistry labs. Catalysts are platinum for the fuel and silver for the oxidant.

Price of the model is \$9.75.



Model fuel cell turns propeller on small electric motor, demonstrating electrical energy generated by chemical reaction. Model is available for instructional and educational purposes.

### Introduce Heat Pump for Mass Housing Market

A heat pump, designed to meet the needs and requirements of the mass housing market, has been introduced by Westinghouse Electric Corp. The unit is completely self-contained and is designed to be installed on the outside of the home, thus ensuring quiet, economical operation, according to Joseph Cerny, residential products manager for the air conditioning division.

Entire WhispAir Heat Pump hangs unobtrusively on outside wall, giving adequate heating and cooling for mild temperature areas along with extremely quiet operation. Unit is shipped completely assembled and pre-wired.



Field tests in Miami, Tampa, St. Petersburg, New Orleans, Phoenix, and Los Angeles have proven the unit's effectiveness. One contractor has estimated the complete installation, including all materials, labor, and the unit itself, at between \$495 and \$550.

(Continued on page 56)

### Employs Sign Sections For Enclosure

Aluminum sign extrusions have been used by Union Electric to build a low cost, yet unobjectionable substation enclosure.

The 20 ft by 9 ft extruded sign sections, fabricated by Reynolds Metals Co., were erected at the company's Sunset substation. Union Electric found the enclosure less expensive than metal picket fence, fabricated redwood louver panels, and masonry walls.

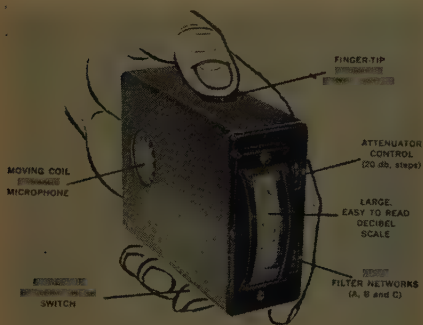
Sign sections provide a neat, clean-looking enclosure that hides much of the substation equipment.



## Sound Survey Meter

Sound survey meter by **The Korfund Co., Inc.** assists in locating the source of potentially harmful sound levels and in the design of quieter electromechanical equipment. Named Korfund Sound Survey Meter (Type B), this vest-pocket-sized instrument indicates sound pressure levels from 40 to 125 db, and has a frequency response well within the ASA specified tolerances in the 45 to 8000 cps spectrum. Designed for one-hand operation.

*Circle item #25 on reply card*



## Ringless Meter Sockets

Ringless meter sockets by **General Electric Co.** are available for 100- and 200-amp single-phase services. The 16-gauge zinc-coated steel sockets are available in three sizes for 100-amp ratings and two sizes for 200-amp demands. Six knock-outs are provided in the case sides, bottom and back to permit selection of appropriate connections. Conduit from one to 1½ in. diam. can be accommodated.

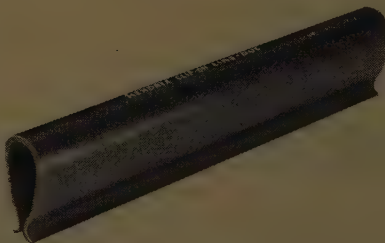
*Circle item #26 on reply card*



## Cable Processor

Portable cable processing unit by **Mark Naught, Inc.** cuts and repairs cable, makes slings, eyes, chokers and splices right on the job. The Mighty Mark is a self-contained portable hydraulic press. It exerts 15 tons of pressure and handles cable up to ½-in. diam. under all types of conditions; the larger unit handles cables from ½-in. up. The machine operates as efficiently under water as it does on dry land.

*Circle item #27 on reply card*



## Precision Tank Gaging

A new technique by **Exactel Instrument Co.** for tank gaging problem liquids uses Exactel mercurial Servomanometers operating on the purge bubbler principle. Pressure at the bubbler line equals head at tank bottom equals head pressure of the liquid measured. Hence is converted to in. of mercury with readout in appropriate direct units. The only material contact with the material measured is a tube extending to tank bottom.

*Circle item #29 on reply card*



## Fuse-Disconnect Combo

Two new fuse tubes and a new disconnect blade by **S&C Electric Co.**, permit interchanging any five different ratings in a single open cutout. Fully interchangeable in S&C's Type XS single-vent cutout are a new 300-amp disconnect blade, a new 200-amp fuse tube, a new 100-amp fuse tube plus two existing 100-amp fuse tubes. Cutout ratings can be changed quickly as a lineman can change fuse tubes or blades.

*Circle item #30 on reply card*

## Helps Prevent Abrasion

**Clip-On-Line-Duc** by **Hendrix Wire & Cable Corp.** prevents insulation and sheath abrasion by trees or other foreign objects and provides insulation values up to 15 kv. It can be quickly and easily clipped on open distribution conductors, cabled service drops, and communication cables. Made of track-resistant polyethylene, it saves installation time, minimizes tree-trimming, expensive replacement of conductors and cables.

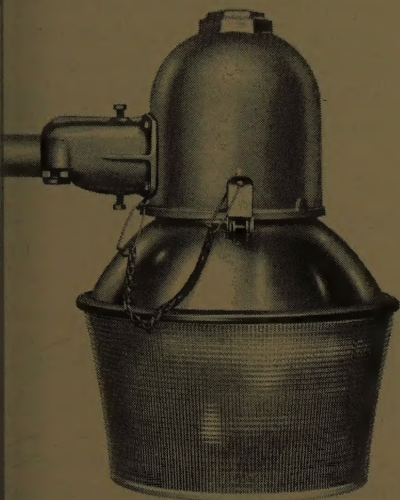
*Circle item #28 on reply card*



## Open-Refractor Luminaire

Open-refractor luminaire by Josn Mfg. and Supply Co. consists of an Alzak-processed aluminum reflector, standard NEMA head and slyn-Holophane refractor. Open bottom makes it easy to relamp. It accommodates incandescent lamps to and including 6000-lumen or 5-watt mercury lamps. Ideal for residential street lighting as well as suburban and rural yard lighting.

Circle item #31 on reply card



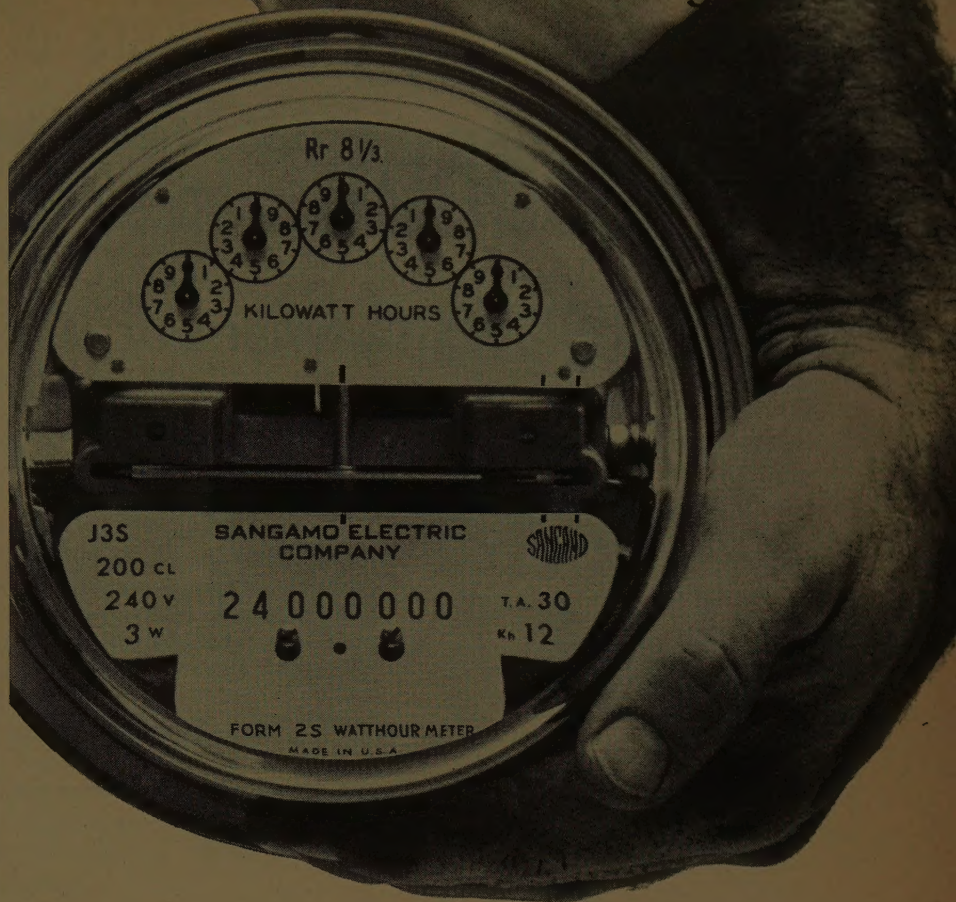
## Electric Strength Testers

Mobile high voltage a-c breakdown testers designed for proof tests, trouble locating and maintenance programs are available from Associated Research, Inc. The A-C Mobile Hypot models provide insulation breakdown tests of cables, shings, switchgear, transformers, well as motors and generators. A selection of several models is offered with outputs up to 20 kv 10 kva and to 30 kv at 5 kva. Larger ratings available.

Circle item #32 on reply card



*Unsurpassed in Metering Value...*



## Unique Magnetic System

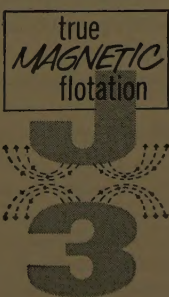
*free-floating...surge resistant...self-cleaning*

The true magnetic flotation principle used in the Sangamo J3 Watthour Meter is unique! Two bonded cylindrical Alnico magnets with opposing magnetic fields float the disk freely.

The extra high coercive force Alnico material used in the magnetic system retains its strength even through repeated lightning and load surges, assuring accurate long-term registration.

Sangamo manufactures the magnets for precise magnetic and mechanical uniformity to assure performance stability in the J3 floating system. These magnets maintain a visible 1/16 inch cushion—magnetic particles are repelled from the gap... eliminating erratic light load registration.

This true magnetic floating system is designed for easy and positive control of disk position and endshake. It never requires costly maintenance or replacement... the floating system is guaranteed for the life of the meter.



**SANGAMO ELECTRIC COMPANY**

SPRINGFIELD  
ILLINOIS

# AMCHEM, the makers of Weedone, can solve your brush problem...*whatever it is*

## LINE CLEARANCE



Turn brush-choked utility rights-of-way into brush-free areas quickly and economically with WEEDONE/WEEDAR brush control chemicals. Also now available—complete brush control programs through new "dormant cane broadcast spraying" techniques.

## ROADSIDE CLEARANCE



New AMIZINE Weed Killers and AMIZOL combinations provide complete vegetation control along thousands of miles of roadsides, center strips, embankments, guard rails, etc.

## RIGHT-OF-WAY CLEARANCE



Specialized Amchem techniques using WEEDONE/WEEDAR chemicals and AMIZINE/AMIZOL combinations provide high control, low cost chemical brush eradication programs for railroads.



## AMCHEM PRODUCTS, INC.

Amchem, Weedone, Weedar and Amizol are registered trademarks of  
AMCHEM PRODUCTS, INC. (Formerly American Chemical Paint Co.)  
AMBLER, PA. • Niles, Calif. • St. Joseph, Mo.

AMCHEM PRODUCTS, INC., Ambler, Pa.

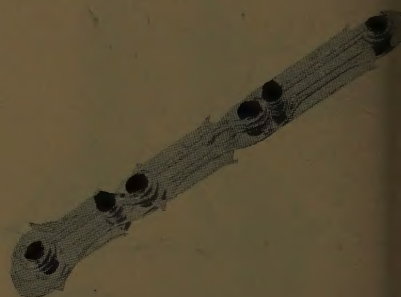
Please send me copies of your "Brush Control" brochure and full information on the uses of Weedone Brush Killers.

Name \_\_\_\_\_ Title \_\_\_\_\_  
Company \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_ Zone \_\_\_\_\_ State \_\_\_\_\_

## 15-kv Vertical Spacer

15 kv vertical Hendri-Clan spacer for aerial cable by Hendri Wire and Cable Corp., consists of two identical halves of molded Plexiglas which are secured by single Plexiglas assembly nut and bolt with self-locking threads. Unit provides for a messenger and three conductor cables, each spaced about 6½ in. apart vertically. Split neoprene bushings have ID's to fit specific messenger and phase conductors.

Circle item #33 on reply card



## Introduce Heat Pump . . .

(Continued from page 51)

With a 17,000 Btu heating capacity, the units are of special interest to builders, developers, and utilities in the southern part of the country. Since concrete block construction is prevalent in that section of the country, the unit is designed so that it can be installed in a block construction house by merely leaving openings in two blocks in the wall. Special brackets fit the openings and accommodate both ducts for the cooled or heated air to pass into the house and for return. It is also easily adaptable to any other means of construction as well, Mr. Cerny pointed out.

The unit has an 18,000 Btu cooling rating, which is equivalent to 1½-tons cooling capacity. Each unit will serve a house with 1000 sq ft of area; for larger houses, two units would be needed.

All units are factory assembled completely self-contained in an embossed aluminum cabinet, with all parts pre-wired, including the thermostat.

Weighing only 230 lbs, the unit is 25-in. wide, 72-in. high, and 12-in. deep.

Harry G. Slater has been elected vice president of Niagara Mohawk Power Corp., according to an announcement made recently by Earle Machold, president.

Mr. Slater, now associate general counsel, will have executive supervision of a new state-wide department which will bring together various departments concerned with over-all promotion and sale of electricity, and gas, and customer, investor, and all other public relations. The new department will encompass system commercial promotional operations, public relations, advertising and publicity, and Niagara Mohawk's upstate area development program.

According to Mr. Machold, Mr. Slater will also continue to function as associate general counsel.

## Men of Power Briefs

M. Fisher, Jr., has joined the Power Co. as an industrial development engineer. He will operate in the northern area of the system.

Weniville Light & Power System announced the appointment of A. Parrack as manager. He succeeds the late Alvin H. Leonard.

Thur Naquin, safety counselor New Orleans Public Service has been named the recipient of the newly-established Browne-Hardy award for meritorious distinguished service in the advancement of principles and practices of safety and loss prevention. The award was made by the Delta City Society, the New Orleans Chapter of the American Society of Safety Engineers, and the Metropolitan New Orleans Safety Council.

Werner Cleveland Electric Illuminating manager of public relations and institutional advertising, John Gunn, has been elected a vice president of Bozell & Jacobs, Inc. He has also been named director of advertising and public relations for the company's newly established Investor-Related Utilities Service division.

# ●○| MEN OF POWER

## Southwestern E.S. Elects Two

Directors of Southwestern Electric Service have elected two department heads to position as officers in the company. They are: Charles D. Goforth, elected as vice president, and E. W. LeNeveu, elected secretary.

Mr. Goforth has been general sales manager since 1959. In his new position he will be in charge of sales and industrial development.

Mr. Goforth has been with Southwestern E.S. since 1947, when he became manager of the company's Overton office. He was named director of industrial development in 1955 and general sales manager in 1959.

Mr. LeNeveu is a 26-year veteran with the company. He became manager of advertising and publicity in 1953, the position he held until his election to secretary of the company.

## CILCO Adds VP

Harry D. Feltenstein has been elected vice president of Central Illinois Light Co. He was formerly sales service director.

A 20-year veteran with the company, Mr. Feltenstein joined the utility as a groundman. He was transferred to the gas heating department in 1946 and in June, 1948, was named sales engineer for the Peoria office. He was promoted to service sales supervisor at Pekin in 1952.

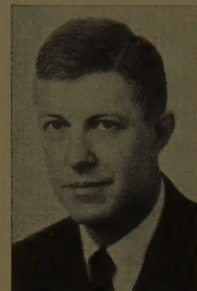
In 1954, Mr. Feltenstein was appointed to take charge of CILCO's area development and was named public relations director. He became Peoria division sales manager in 1955 and service sales director early the following year.

## Blackburn Names Exec VP

William E. Wilton has been elected executive vice president of Jasper Blackburn Corp. He was formerly vice president in charge of engineering manufacturing and has been with the company since 1938.

## New BPA Administrator

Charles F. Luce has been appointed administrator of the Department of the Interior's Bonneville Power Administration, according to an announcement by Secretary of the Interior Stewart L. Udall. Mr. Luce succeeds Dr. William A. Pearl.



Luce

Mr. Luce's initial natural resources experience was gained as a member of the legal staff of BPA where he served for two years. He also served a short period as legal consultant to the Secretary of the Interior in 1949. Mr. Luce has been engaged in the practice of general law in Walla Walla, Wash., for the past 15 years.

## Westinghouse Picks Wilcox

George L. Wilcox has been elected vice president and assistant to the president of Westinghouse Electric Corp. He has been president of Canadian Westinghouse Co., Ltd., with headquarters in Hamilton, Ontario, since 1955.

Mr. Wilcox will be located in Pittsburgh and will undertake special assignments for the president in matters of domestic and foreign competition and customer relations.

Previous to joining Westinghouse in 1942, Mr. Wilcox was employed in various positions by Consolidated Edison.

## Elect Kirkby at G&W

Norman O. Kirkby has been elected vice president of G&W Electric Specialty Co., and will serve as general manager of the firm.

He succeeds W. F. Young who has retired as executive vice president of the company. Mr. Young continues with the company in an advisory capacity.

# CALENDAR OF EVENTS

March 5-8—Third Annual Lighting Exposition, World Lighting Forum, New York Coliseum, New York, N. Y.

March 5-9—American Society of Mechanical Engineers, Sixth Annual Gas Turbine Conference, Shoreham Hotel, Washington, D. C.

March 6-8—American Management Association, Seventh Annual Data Processing Conference and Exhibit, Statler-Hilton Hotel, New York, N. Y.

March 9-10—AIEE, IAS, IRE, Second Symposium on Engineering Aspects of Magnetohydrodynamics, University of Pennsylvania, Philadelphia, Pa.

March 13—Interstate Power Club, Beverly Hotel, New York, N. Y.

March 16-17—Edison Electric Institute, Industrial Relations Committee, Mayflower Hotel, Washington, D. C.

March 20-22—Edison Electric Institute, Sales Conference, Edgewater Beach Hotel, Chicago, Ill.

March 21-23—American Power Conference, Sherman Hotel, Chicago, Ill.

March 27-29—Southeastern Electric Exchange, Annual Conference, Boca Raton Hotel and Club, Boca Raton, Fla.

April 5-6—North Carolina State College, The South Atlantic Wood Utility Pole Conference, State College Campus, Raleigh, N. C.

April 6-7—American Society of Mechanical Engineers, Management Engineering Conference, Statler-Hilton Hotel, New York, N. Y.

April 6-7—Pacific Coast Electrical Association, Engineering and Operating Section, Ambassador Hotel, Los Angeles, Calif.

April 10-14—American Society of Civil Engineers, Annual Convention, Westward Ho Hotel, Phoenix, Ariz.

April 17-19—A & M College of Texas, Fourteenth Annual Conference for Protective Relay Engineers, College Station, Tex.

April 17-18—Pacific Coast Electrical Association, Business Development Section, Sheraton-Palace Hotel, San Francisco, Calif.

April 20-21—Edison Electric Institute, Industrial Relations Committee, Joint meeting with Personnel Administration Section, Southeastern Electric Exchange and the Southwestern Personnel Group, Roosevelt Hotel, New Orleans, La.

April 26-27—Indiana Utility Association Twenty-first Annual Young Men's Utility Conference, Severin Hotel, Indianapolis, Ind.

April 27-28—Pacific Coast Electrical Association, Administrative Services Section, Villa Hotel, San Francisco, Calif.

May 1—Interstate Power Club, Beverly Hotel, New York, N. Y.

May 8-10—Instrument Society of America, 4th National ISA Power Instrumentation Symposium, LaSalle Hotel, Chicago, Ill.

May 17-19—Pacific Coast Electric Association, Annual Convention, Sheraton Palace Hotel, San Francisco, Calif.

May 22-24—American Institute of Electrical Engineers, American Rocket Society, Institute of Radio Engineers, Institute of Aerospace Sciences, Instrument Society of America, National Telemetering Conference, Sheraton Towers Hotel, Chicago, Ill.

June 28-30—American Institute of Electrical Engineers, Instrument Society of America, American Institute of Chemical Engineers, American Society of Mechanical Engineers, Institute of Radio Engineers, Second Joint Automatic Control Conference, University of Colorado, Boulder, Colo.

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